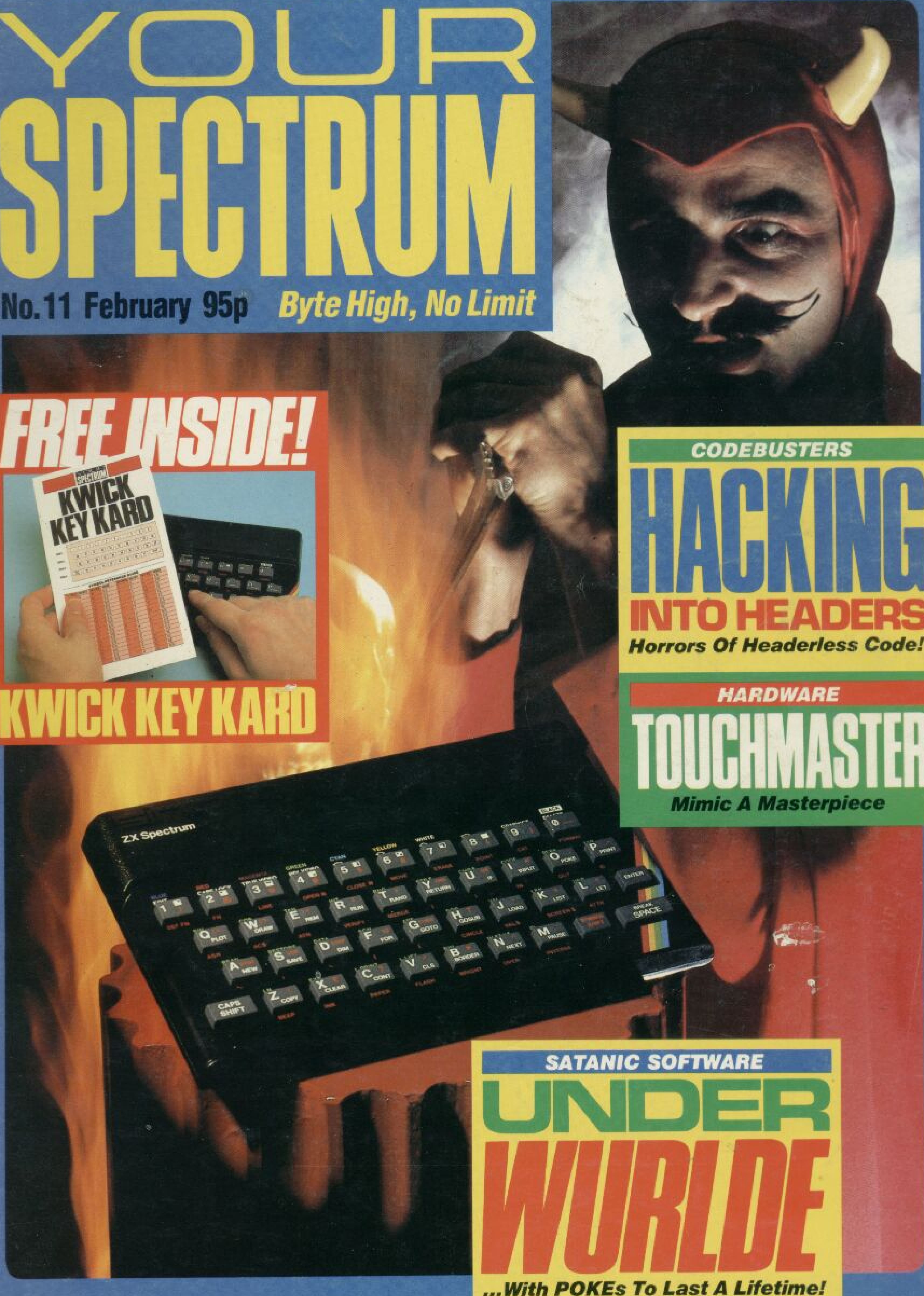
IS ZX BASIC DEAD? SEE OFFER ON PAGE 36!

YOUR SPECTRUM

No.11 February 95p *Byte High, No Limit*



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Horrors Of Headerless Code!

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INSIDE YS

SOFTWARE

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Routine Errors Don't fight it! Make the Spectrum ROM's error routine work for you. *John Durst*



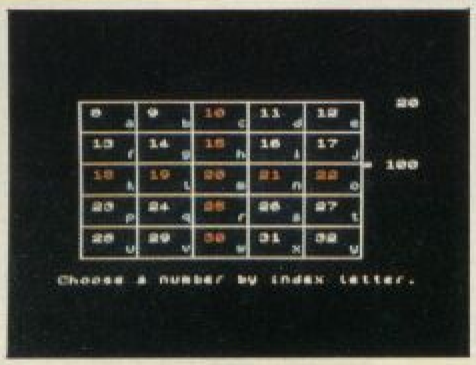
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Every Picture Tells A Story Not everyone's got the artistic flair of Rembrandt ... but this program will show you where to draw the line! *Chris Somerville*

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Machine Code Commands Calling Basic from machine code? It's not quite as easy as you may think ... *Dr David Threlfall*

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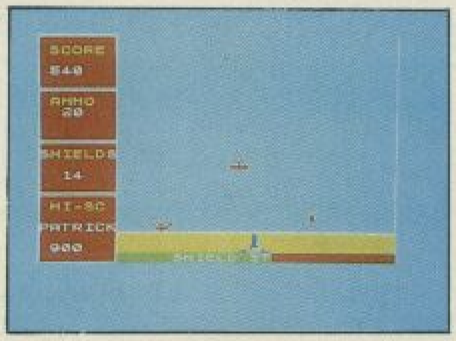


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Magic Numbers The mystery of magic — it's all here! *M Loftus*

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Mode Music Sound effects to suit your mode! *Maurice David Wood*



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Protector A 'shoot-'em-up' game in the best arcade tradition. *Pat Donnelly*

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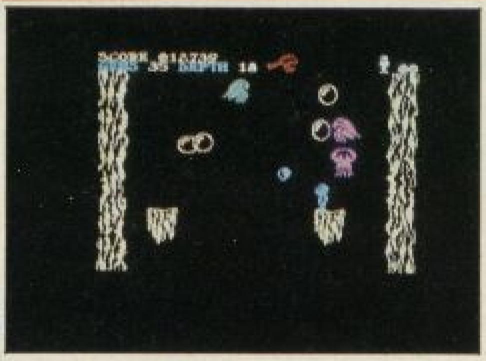
Touch And Go! Is doodling a doddle on the Touchmaster? Check it out inside ... *Henry Budgett*

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ON THE LINE

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FRONTLINES

Controversial comment on the Spectrum news scene,* From The Hip, QL Affairs *... and there's a quid off Hewson Consultants'* Avalon *to boot!

HARE TODAY, £30K TOMORROW

Here we go — it's just like Fleet Street all over again! Only it's not Bingo this time, but sorting out the clues from an adventure program.

HareSoft, a new company on the software scene, has announced a treasure hunt based on its latest package *Hairaiser.* And the winner could take away Kit Williams' Jewel of the Golden Hare (of *Masquerade* fame) or £30,000. And for those without calculators that's £5,000 more than you'll win at Domark's *Eureka.*

Who'll be brave enough to launch the first £1 million prize for winning a computer game? It's a shame Imagine went down the tubes — that would have been right up its street.

GOING FOR GOLD



Jet-setter Mike Hale poses with his Gold Cassette.

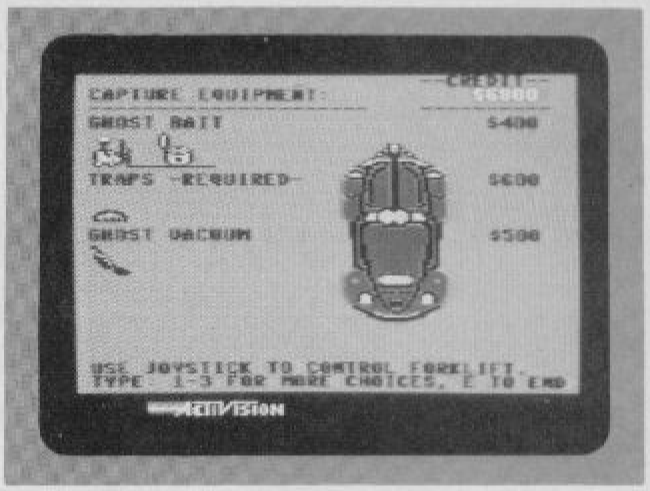
Mike Hale, Hewson Consultants' *Nightflight II* and *Heathrow ATC* programmer, has been presented with a Gold Cassette for sales exceeding 100,000 cassettes. 'Golden Boy' Mike, spent just *some* of his royalties on a Ralley Tampico single engine light aircraft (*Just don't mention the Lear jet I bought last week. Ed*).

But Mike's not the first programmer to receive the Gold Cassette award; the first one went to Sandy White, author of *3D Ant Attack.* No doubt we can probably expect a whole flood of Gold Cassettes appearing soon!

WHO YA GONNA CALL?

It was jolly nice of Activision to invite the *YS* staff down to a preview of the movie *Ghostbusters* on Halloween night. The reason for all this 'free-lunch' generosity? Well, you're not going to believe this ... but Activision has actually managed to release *Ghostbusters* — the Spectrum game — *before* the movie goes on general release!

Following the film quite closely, you can even sing along with the theme by Ray Parker Jr by following the bouncing ball along the lyrics on the screen. Pressing the space key yields the Ghostbusters cheer to punctuate the tune in the right place. Probably one of the best bits of the program!

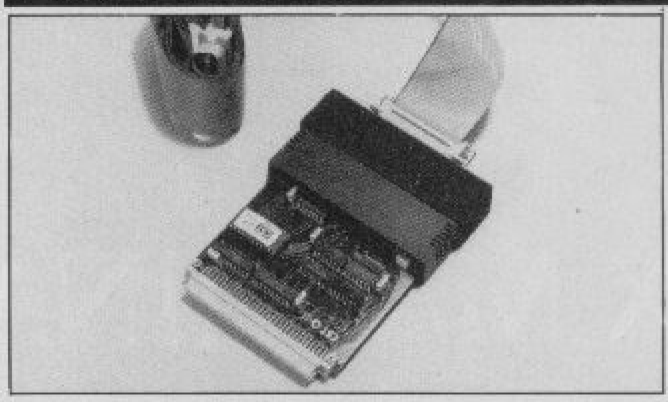


All the thrills and spills of the movie — Activision's *Ghostbusters.*

The game's plot is to avert the oncoming invasion of New York from the rapidly increasing number of ghosties, progressing to the final conflict at the Temple of Zuul. Various objects can be used to help in your task — such as an Energy Detector, Image Intensifier, Marshmallow Sensor, Ghost Vacuum, etc, etc. It may sound crazy, but go see the movie and it'll all begin to make sense.

Anyway, *Ghostbusters* gets our vote of confidence, even if it does cost £9.99. Available now from the usual stockists.

DROP 'EM



CST drop the price of its Centronics I/F to £50 + VAT.

Cambridge Systems Technology has now dropped the price of its Centronics interface for the QL, as it claims demand has been so high! The Q-PI will now cost £50 excluding VAT.

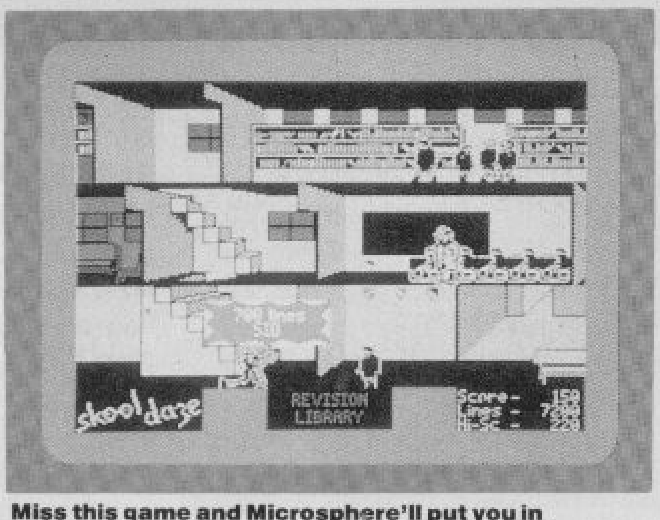
The interface features an on-board driver allowing it to be driven from SuperBasic (or any other installed language).

More details on 0353 2216.

MOVE OVER MOLESWORTH

If you remember taking part in 'wizard pranks on poor ol' teach' and 'stuffing your face with lashings of ginger beer after lights out', then Microsphere's *Skool Daze* is probably right up your street.

It's one of those jolly whizzo games in *Famous Five* fashion. You see, what's happened is that all your school reports are locked up in the safe, and you have to daze, knock down or hypnotise the masters into giving you the four-letter combination.



Miss this game and Microsphere'll put you in detention.

Sounds like every schoolchild's dream!

Phone up Microsphere on 01-883 9411 ...



This clever little piece of hardware is known as the Slowmo. It gives you control over the speed of whatever game you've got loaded up. You can slow the action down to very, very, slow, and there's also a 'freeze' button if a call of nature suddenly takes you by surprise. If you're in the market for one of these attractive add-ons (priced at £14.95) give Cambridge Computing Research a ring on 0223 214451.



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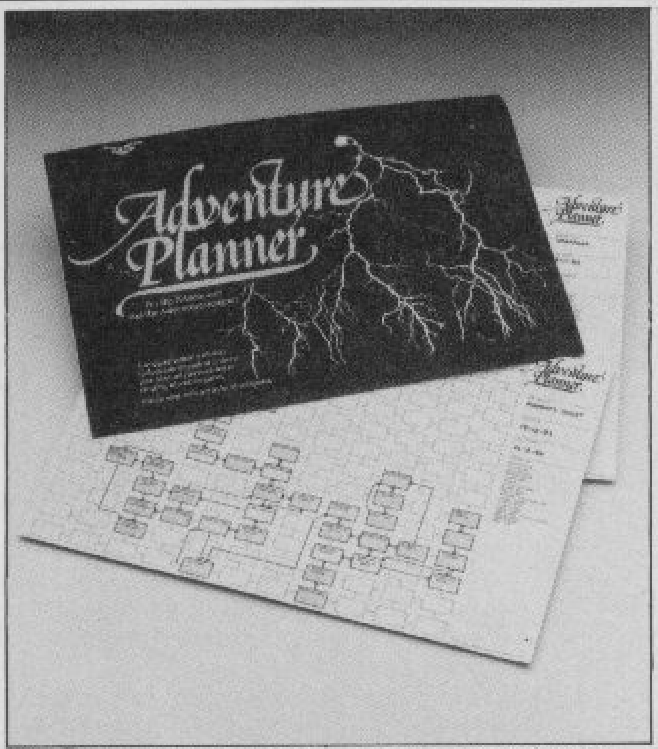
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ALL MAPPED OUT



P 'n' P's Adventure Planner — an adventure freak's dream come true!

Next time you get lost in a Level 9 adventure, don't come crying to us! Maybe you should have invested in a 50-page planning pad from Print 'n' Plotter Products.

Adventure Planner is an A3 pad that allows you to plan, or keep a permanent record of, any adventure game. On each page, you'll find a convenient mapping system with over 150 locations, examples, hints and tips.

Your best bet is to look out for Adventure Planner in the shops as it'll only cost you £3.95. Phone 01-403 3622 for details of your nearest stockist, or mail order details at the more expensive price of £4.50.

KIDDING AROUND



A scene from *Pirate*, one of Five To Twelve's educational titles.

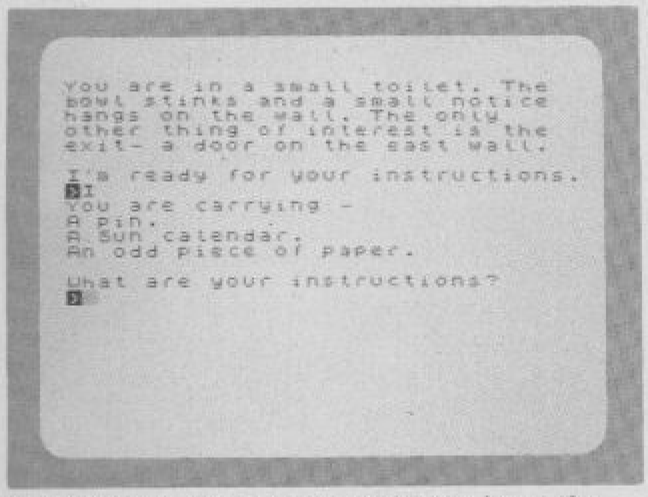
You can now get hold of a catalogue of educational software from Five To Twelve. Its programs range from those giving practise in basic programming skills to adventures, which require users to make decisions, plan ahead and develop thinking skills.

Five To Twelve boasts that many features of popular games are included in its programs to make them more fun. Ring 0323 892255 for a brochure if you're interested ...



We at *YS* saw a pre-production keyboard unit from Mancomp at the PCW Show last September — it seems they wanted our criticisms before it was released. A few months later and the device looks much the same, although Mancomp claims it'll be further improved. Priced at £54.95, if there's any modification you'd like added before it's released, ring the company on 061-224 1888. Perhaps Mancomp'll listen to you ...

PROGRAMS FOR PERVERTS?



Malan's *Herpes Or Bust* — bug-ridden software for the over 18s.

Now, if you're under 18 years of age, you shouldn't read any further! But, for our older audience, here's news of a couple of 'computer nasties' that've somehow found their way into the usually tasteful *YS* editorial office.

Have you ever heard of Albert Battersby? No? Well, that's probably lucky for you as he sounds a right nasty piece of work. Malan Associates has got this immoral, disgusting individual taking part in a couple of openly perverted, sex-driven programs. The titles of these programs, if you're planning a Mary Whitehouse-type campaign to stamp out filth from our computer screens, are *Soho Sex Quest* and its sequel *Herpes or Bust*.

It certainly seems a shame that Malan could find no better subject on which to base on a computer game. Readers wishing to downgrade their Spectrums with software of this kind can no doubt find out Malan's phone number for themselves.

PRACTICAL MACHINE CODE PROGRAMMING
Steve Webb/Virgin Books

There are two fundamental approaches to the teaching of machine code. The first is to assume the reader knows nothing about computers at all, so everything kicks off from the very beginning; the other makes use of reference to Basic, as a way of putting over some idea of the concept behind the instruction being taught. *Practical Machine Code Programming* falls into the latter camp — a sort of 'soft' approach for those who already have a fair knowledge of Basic.

Steve Webb opens his account with a description of what machine code is and how numbers are stored in memory and follows that with the *de rigeur* run-down of the 'ins and outs' of binary and hexadecimal. The first few chapters are obviously designed to teach the bare essentials of machine code programming. Things then get Spectrum specific, with



descriptions of how the display and attribute memory is arranged, and also how you read the keyboard and create simple sound effects. But nowhere in the book is there any mention of assemblers or assembly language.

The book now switches track completely and starts to describe the relevant processes that lie behind a few simple machine code games.

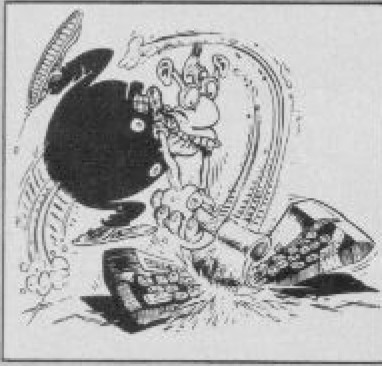
Each routine is reasonably well described and accompanied by a non-standard flowchart. And, although the programs are written in a rather non-efficient way, they are fairly easy to follow.

As usual there's a selection of standard pixel and attribute scrolling routines.

I can't say that overall the ideas in the book are my personal favourites ... certainly the volume won't be one that comes high on my recommended reading list. On the other hand, at £3.95 what have you got to lose?

Tony Samuels

HACKING



AWAY

All the POKEs and more! Send your hacking hints to Andrew Pennell, Hacking Away, Your Spectrum, 14 Rathbone Place, London W1P 1DE.

First up, thanks for all your letters — keep sending them in!

Where better to start this month's column than with a couple of Ultimate programs. Someone who lives in Rotherham (but forgot to sign his or her letter) sent in POKE 25373,255 for *Jet Pac*, which will give near inifinite lives. **David Hasler** provided POKE 26075,0 — which allows the rocket to take off, but you only need one fuel pod instead of the usual six. Nice one, David! Alternatively, try **J Huffer**'s POKE 250 20,0 to give you true endless lives. He also supplied POKE 24984,0 for endless lives on *Pssst* (and also POKE 24743,0 for *Zzoom*).

Next, **Larry Penrice** sent in POKE 26197,0 for *Cookie*, which stops the bin monster from throwing its rubbish out of the bins. I *like* this sort of modification in a game — it alters the tactics you use for play, without making it too easy. **Andrew Dawson** wrote in with POKE 36519,0 for endless lives for *Atic Atac*, and notes that when you use it the tombstones are reluctant to appear after the first few deaths. He also submitted POKE 36965,0 for a similar effect on *Lunar Jetman*, though he says it's not much help to him anyway!

ON THE OCEAN WAVE

On the international front, I received a letter from Le Page Said, Brussles, containing piles of infinite lives POKEs. And here they are: Silversoft's *Freez Bees* — POKE 34610,0; Automata's *Pi-Balled* POKE 44416,x, where 'x' is any number of lives; and Ocean's *Moon Alert* — POKE 39754 for endless lives, POKE 42404,x, for 'x' lives (up to 14 only) and POKE 42654,195 for immortality!

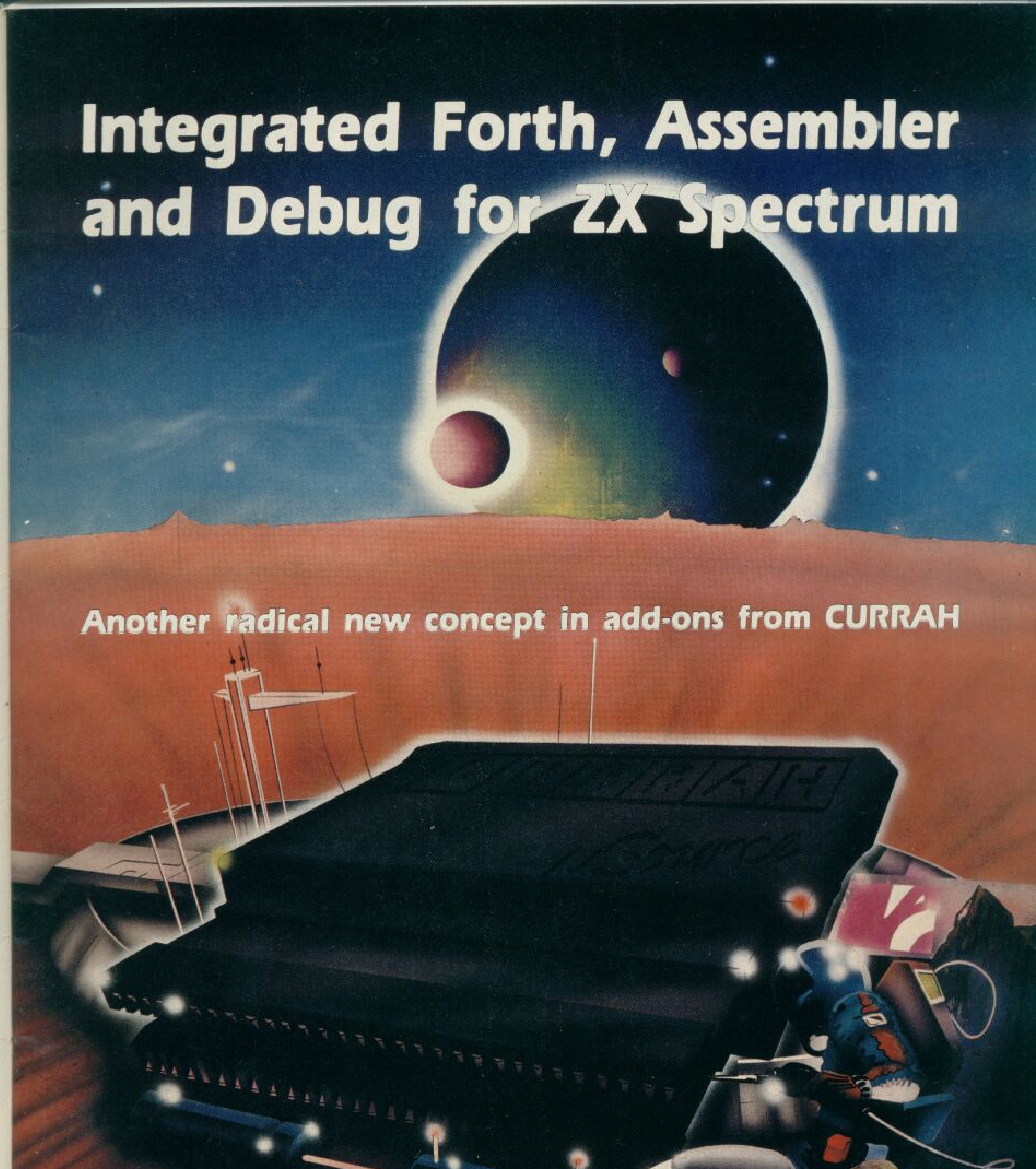
The letter also admitted that the task of putting *Halls of the Things* on to Microdrive had proved too difficult. Well, Crystal's loader is certainly a tricky beast, but I'm sure one of our readers has cracked it!

Getting back to Ocean's *Moon Alert*, **Nicholas Smith** sent in POKE 42249,24 to stop the time going down, and POKEs 42585,2 and 52596,2 to keep it scrolling fast in all parts of the screen. He's also included POKEs for *Psytron* — what you have to do is load the game (except the last part), type BORDER 7, and 'POKE 28625,0:POKE 28626,0' for endless fuel, 'POKE 41098,17: POKE 41099,32: POKE 41100,1: POKE 41101,0' for endless men, and 'POKE 26142,62: POKE 26143,255: POKE 26144,0' for endless oxygen. Nicholas points out that none of his mods work on the final level due to some nifty integrity-checking by the program itself — shame!

Euan Hastings supplied POKE 28277, (for 'x' lives) in PSS's *Frank N Stein*. He also asks for infinite lives for *Monty Mole*, as he can *only* get to the 22nd screen! Well, I know for a fact that Dave Nicholls has cracked this one open, so I'll try and prise the secret out of him in time to report back next issue. OK?

If you've got any POKEs or tips on programs, or need an unusual feature added to a game, drop a line to Andrew Pennell, Hacking Away, *Your Spectrum*, 14 Rathbone Place, London W1P 1DE. C'mon, don't be shy!

POKEing PARLEZ
OK, now you've got the POKEs, what do you do with them? First, load the game using MERGE "" (unless you're told otherwise), press Enter and start the tape — just as you would do for a normal LOAD "". When the 'OK' message pops up on-screen, stop the tape. Now type LIST and make the suggested changes as detailed in the article. Once done, press RUN and Enter, and start the game again. That's all there is to it!



Next month CURRAH launch μSOURCE, their most advanced product yet. μSOURCE lets you write and use Assembler or FORTH in BASIC lines, so you can run these advanced languages by themselves or even 'integrate' them into BASIC programs.

μSOURCE gives you the ability to write ultra-fast, highly compact programs which use the powers of all three languages, yet is so user-friendly that even a novice will be using it in minutes! Add advanced features like a full Debug, so you can easily correct your programs, and at £44.50 you can give your Spectrum on-board programming power only found on more expensive machines.

Send in now for an advance information pack to: CURRAH, Hollymount, Hartlepool TS26 0HA.

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Designed exclusively for the ZX Spectrum, Protocol 4 brings you game control customising in a way that no other interface does. It can accept all commercially standard joysticks, including the Quickshot II with 'rapid fire' or Trackball controllers, and is compatible with ALL Spectrum software. **OPERATES LIKE FIXED OPTION INTERFACES OR CAN BE FULLY HARDWARE PROGRAMMED**

The flexibility of Protocol 4 control is achieved by a specially designed 'CustomCard' system. CustomCards are easily programmed to suit all types of games.

Simply clip in a programmed card for immediate customised control. With preset cards supplied Protocol 4 can emulate the following control standards: AGF/Protek, Kempston and ZX Interface 2 — both players. You can change or reprogram blank cards (1 supplied) to get the responses you want — even on games without joystick options.

Utilising Hardware Programmed technology you have the benefit of automatic eight direction control, no power-down programming loss, guaranteed conflict-free operation with other peripherals, including microdrives, and no extra software to load or awkward joystick movements and key presses to make each time you load another game. The keyboard remains fully operative at all times.

It is also perfectly possible to connect up to five Protocol 4's on one Spectrum, each programmed separately, for multiple player control — only possible with the hardware programmed design.

Incorporated into the design is a computer Reset button for clearing the computer memory between games without pulling the power plug out.

Fully guaranteed for 18 months, Protocol 4 comes supplied with five CustomCards, ten Quick Reference Programming Cards and complete instructions.



PROGRAMMABLE INTERFACE

As the first fully hardware programmed joystick interface, this product has become well established over the past year and will accept ALL standard joysticks or trackballs, including Quickshot II with 'rapid fire', for use with ALL Spectrum or ZX81 software — not just those with a joystick option.

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* Programming is *not* lost when power is disconnected between games.
* Eight way movement — with or without the fire button pressed — only requires setting of the four normal directions.
* Compatibility is guaranteed with ALL key reading techniques — machine code or BASIC.
* Several interfaces can be separately programmed and fitted to one computer for multiple player games.

Keyboard operation is totally unaffected by this interface, as with all AGF add-ons, and will never conflict with *any* other device fitted at the same time.

Twelve months guarantee, key programming information and a pack of Quick Reference Cards, to speed up setting of the clips, are supplied with full instructions.

INTERFACE II

The AGF Interface II represents the best low cost introduction to joystick control.

The 'AGF' control standard is now offered by over 100 games or utility programs for use with any joystick or trackball.

Any game which is controlled by the cursor movement keys (5,6,7,8) or has a Protek option is also compatible with Interface II.

A rear connector allows other peripherals to be connected at the same time.

This product is available for either the Spectrum or ZX81, is supplied with full instructions, a 12 month guarantee, and a 12½% discount voucher against further AGF mail-order purchases.

ROMSLOT

The new AGF RomSlot is designed for anyone who already owns a programmable joystick interface, or prefers to use the keyboard to control games, and would like to add the facility of ROM cartridge software to their system.

RomSlot will accept the Sinclair range of instant loading games and will also be compatible with the new releases from Parker Software — exciting new games only to be available in ROM format.

This system allows instant play. Your computer memory size is not important and you will be able to play games that could ordinarily require more RAM.

RomSlot incorporates an extra feature called 'Restart'. This allows you to instantly *restart* the ROM game.

RomSlot is guaranteed for 12 months and has a full width expansion connector to accept joystick interfaces, speech units and printers etc.

QUICKSHOT

The Quickshot joystick is an excellent value game controller incorporating suction cups for sure-footed precision with a comfortably contoured handle offering a convenient top firing button as well as one on the base.

QUICKSHOT II

Quickshot II has improved styling with a trigger type firing button as well as the top firing action, with a broader base for greater suction stability.

It also has a unique 'Auto-Fire' facility which at the flick of a switch provides a constant rapid firing action simulating a fast trigger finger.

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To: Dept. YS, Ram Electronic (Fleet) Ltd, 106 Fleet Road, Fleet, Hampshire GU13 8PA.

RAM TURBO

Trade and export enquiries welcome.

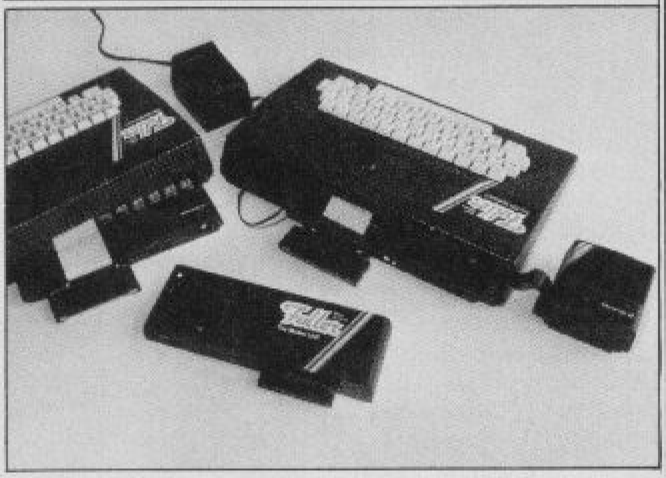
LOVE BYTES

St Valentine's Day (February 14th to you!) is only just around the corner ... and many of you might be making that fated move towards true love. Well, don't do it! At least, not until you've consulted the oracle, anyway ...

Solar Publishing, playing on everyone's emotional insecurity, has released a package called *The Love Oracle*, which is based on the ancient Chinese I-Ching. Dealing with questions like 'Are we compatible?', 'Does my partner love me?' and 'What do I want from life?', the answers are typically philosophical and open to all sorts of interpretations (*Get a bad reading did you? Ed.*). (*Yes. TP.*)

The package is quite expensive at £14.95, but that's because you get a weighty tome called *The I-Ching On Love* by Guy Damian-Knight thrown in. Consult the oracle on 01-251 8119.

NORDIC, NEÉ FULLER



The Nordic range of goodies ... as advertised by Fuller!

Well, it was on the cards that Fuller would eventually crash — but was it really necessary for the company to solicit orders of keyboards right up until the day it went into voluntary liquidation? Here at *YS*, there've been quite a few calls from upset customers, some of whom actually sent their Spectrums in to be fitted up along with hard-earned cash. Needless to say, that's the last they've heard.

And now, a press release tells us of a *new* company that have taken over the entire rights to Fuller's product range. Sounds great! But, according to ex-Fuller man Frank Lawton, over half of the Nordic crew are from Fuller.

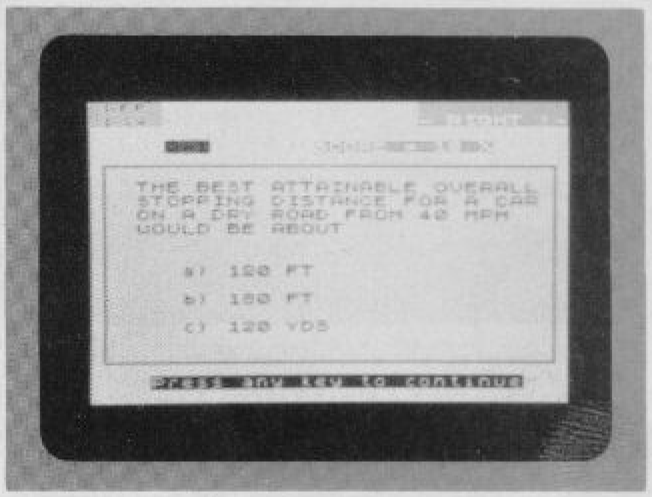
Here at *YS*, we'd be very interested to hear any problems you may be having reclaiming your equipment from the old Fuller. Let's be hearing from you ...

PRANG!

Here we are, in the last few weeks before Christmas and all the software houses are eagerly producing arcade games to set the world alight. So what do CRL come up with ... *The Highway Code!*

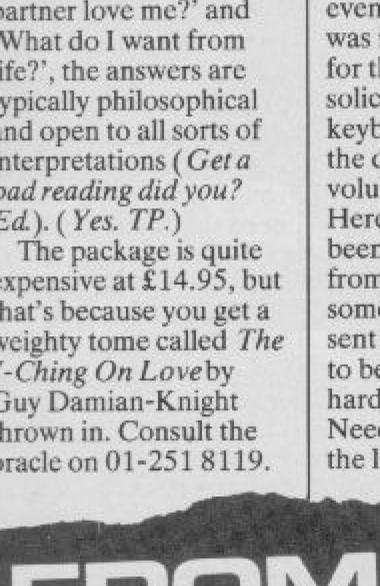
Approved by the Automobile Association it includes over 100 questions, the answers of which can all be found in the HMSO learner book on the highway code. Once you've answered these questions, you're given a percentage rating ... and that's it.

Anyone with more money than sense can lash out £5.95 for the software version of the *much* cheaper HMSO booklet. Smash software for Christmas? Well, it all depends on how you define the word 'smash' really ...



Scintillating stuff from CRL — guaranteed to drive you up the wall!

FROM THE HIP



Pete's phone lines are open from 10am-1pm and 2-5pm on Wednesdays and Fridays. Ring him on his new number — 01-636 2416.

Last month was probably the busiest so far — the phones never stopped ringing! Most of my customers were asking about *Hacking Away* in issue 9 — it definitely seems to have caught your interest and approval. But **John Stalk** of Hampstead reflected many of your calls when he asked how be could actually put these miracle POKEs into his programs.

Well, there's a boxed-off bit giving 'POKEing procedures'; OK, I know it's brief, but for most games you'll find that this method, simple though it may be, actually works! Of course, some games require special attention, but this will usually be given in the piece. To help you out with this month's selection of mods, I'll deal with getting Ultimate POKEs to work (I've just had a look over the Editor's shoulder, and I'm not sure it's that obvious from Andy's piece!). (*I saw that! Ed.*)

Ultimate's range of software all have a one-line loader — and just to make things that little bit harder, it's on line zero. But there's a simple solution. First up, load the tape with MERGE "", and stop the tape once you get the 'OK' message. Now, LIST what you've got so far and copy it down on to a piece of paper. Got that? Right, now pull the plug and once the Speccy's dead, re-connect it back to the power. Re-type the one-line loader, but this time as line one, not zero — and add the POKEs required after the last 'LOAD "" CODE' and before the 'RAND USR xxx'. Press Enter and start the tape up again. Easy really, isn't it ...

While we're on the subject of POKEs, an anonymous caller left a message for me while I was out, telling me of a magical POKE to disable the Break key. Unfortunately, it won't work with the Interface 1 attached, but I'm sure someone out there will be able to put it to good use. Simply type in:

POKE 23613,((PEEK 23730) -5)

To re-enable the Break key, use the following:

POKE 23613, ((PEEK 23730) -3)

I had a few calls from readers who'd tried Dave Nicholls' infinite lives POKEs for *Lunar Jetman* as given in issue 9 — apparently they were wrong! The POKEs should have been POKE 36964,224 and POKE 36965,3. Sorry 'bout that folks — especially as all the readers I spoke to were *extremely polite* when they told me what they had in mind for poor ol' Dave ... something about being forced to play *Transylvanian Tower* for 24 hours non-stop, but I'd stopped listening by then!

Problems, problems, problems! OK, we had a few with *Ocean Defence*, one of our games in *Program Power* in the last issue. In short, the machine code loader we gave you was missing a line — here it is:

30 POKE n,a

Apologies to all those readers who typed it all in without realising the mistake. Also, in that program note that our capitalist printer keeps churning out pound signs (£) instead of hash signs (#). If you haven't done so already, replace those 'PRINT £1' statements with the necessary hash signs.

Big news last! I got so many calls last month that we almost broke the telephone exchange coming into the *YS* tower block (tee hee!). As a result I've been assigned my own number (hah! power at last!) — 01-636 2416 — and you can reach me on Wednesdays and Fridays between 10am and 1pm, and 2pm and 5pm (*Who told him he could have lunch? Ed.*). If I'm on the phone, you'll get an engaged tone .. so don't try any other numbers as I'm *already* on the phone! Just have a bit of patience and ring me back on 01-636 2416 later.

Catch you on the 'phones ...



Here's star of screen and sticker, Mikro-Gen's Wally Week — with the car that the company's sponsoring on the motor racing circuit. The only other computer people we at YS can think of that got involved in the racing world were Acorn. Hmmm? Still they all seem to be smiling, so maybe there's no real cause for concern (*OK, you can put the straightjackets away lads. Ed.*)

NOT THE YS HELPLINE

British Telecom claim to have started the *first* computer information service in the UK. Callers in the Bradford area can dial Bradford 722622 and hear a three-minute tape of somebody wobbling on about computers. The contents of the tape are updated every two weeks and will be tailored to meet the demands of the customers and will cater for all needs.

Maybe someone should have pointed out that *YS* has had a computer information service since February last year, and you even get a live response from Troubleshootin' Pete (*Oh yeah. Ed.*). So keep those calls coming to *us*, and remember that Pete's new phone number is 01-636 2416.

HYPE A SPY



Modular Resources' *Espionage* — a HyperGame?

A new company called Modular Resources literally flooded the *YS* office with the promotional material its putting out for *Espionage.*

Large posters, small posters, car stickers, pens, club memberships, small stickers and table displays came stuffed in a large brown envelope. Oh yes, and there was also a copy of the game!

Espionage is a game of "intrigue and skill in the oil business". Fair enough, the game seems quite good as it happens, but has the market got so rough that a program need this many gimmicks tied to its rear end to help it sell? Maybe the software business *is* going the way of the pop world! Worrying stuff ...

CONCURRENT QL AFFAIRS

All the latest news and views of things QL, courtesy of John Torofex *and* Tim Hartnell.

SINCLAIR FREEBIES!

Just recently, I've been hearing all sorts of rumours of users who've returned their QLs to be 'de-donglised', without enclosing the dongle itself. Sinclair Research don't seem to notice and lucky users receive an updated machine and get to keep the dongle. Anyone out there got any useful applications for a slightly used dongle ... answers on a postcard, etc (*And keep them clean. Ed.*).

Sinclair Research also seems to be sending some users free Microdrive cartridges! The mysterious jiffy bags appear quite of the blue with a complimentary slip and no explanation. It could be that Sinclair Research has chosen this method of compensating users for various hassles they have to put up with while their machines were being repaired. Of course, it could just be on a random basis ... in which case, why haven't I had one yet?

Staying with Sinclair Research for a couple more column inches, I'd just like to say one more thing about the late arrival of issue two of *QLUB News.* I know of at least one QLUB member who's now received three copies of the first issue. What worries me most is that if you re-read the initial QLUB application form, it merely states that members will receive six newsletter a year ... not that each newletters has to be different. Worrying stuff ...

NOT QL BASIC

Bristol software house, Metacomco, is about to release a BCPL Compiler for the QL. And what, I hear you ask, is BCPL. Well, it stands for Basic Combined Programming Language, and it's intended for systems programming — writing operating systems, editors, compilers and the like. In spite of its name, BCPL has nothing at all to do with Basic, and all Metacomco software for the QL (including LISP, Editor/Assembler and the BCPL Compiler itself) is written in the new language. So confident is Sinclair Research of this new language developed for its baby business machine that it's commissioned Metacomco to develop a Pascal Compiler using BCPL.

Still on languages, in *YS* issue 9 I stated incorrectly that Computer One's Editor/Assembler package was written partly in SuperBasic. I'm told it's written in assembly language — sorry about that, Computer One.

ONE LANGUAGE OR TWO?

QL-FORTH is a compiled language, running very quickly (typically, ten times faster than SuperBasic), and is ideal for exploiting the full power of the QL. It's a complete implementation of FORTH in the latest 1983 FIG standard, and comes with a full-screen editor; the Microdrive cartridge is crammed with all sorts of goodies, such as example games and utilities.

However, the language implementation is not restricted to just the FIG standard, as it takes advantage of the QL's sound and graphics. Computer One's *FORTH* provides three channels called: 'input', from which all input is taken; 'output', to which all is output (including the ubiquitous 'OK' that appears tirelessly in FORTH); and 'work', to which all the graphics and windowing words apply.

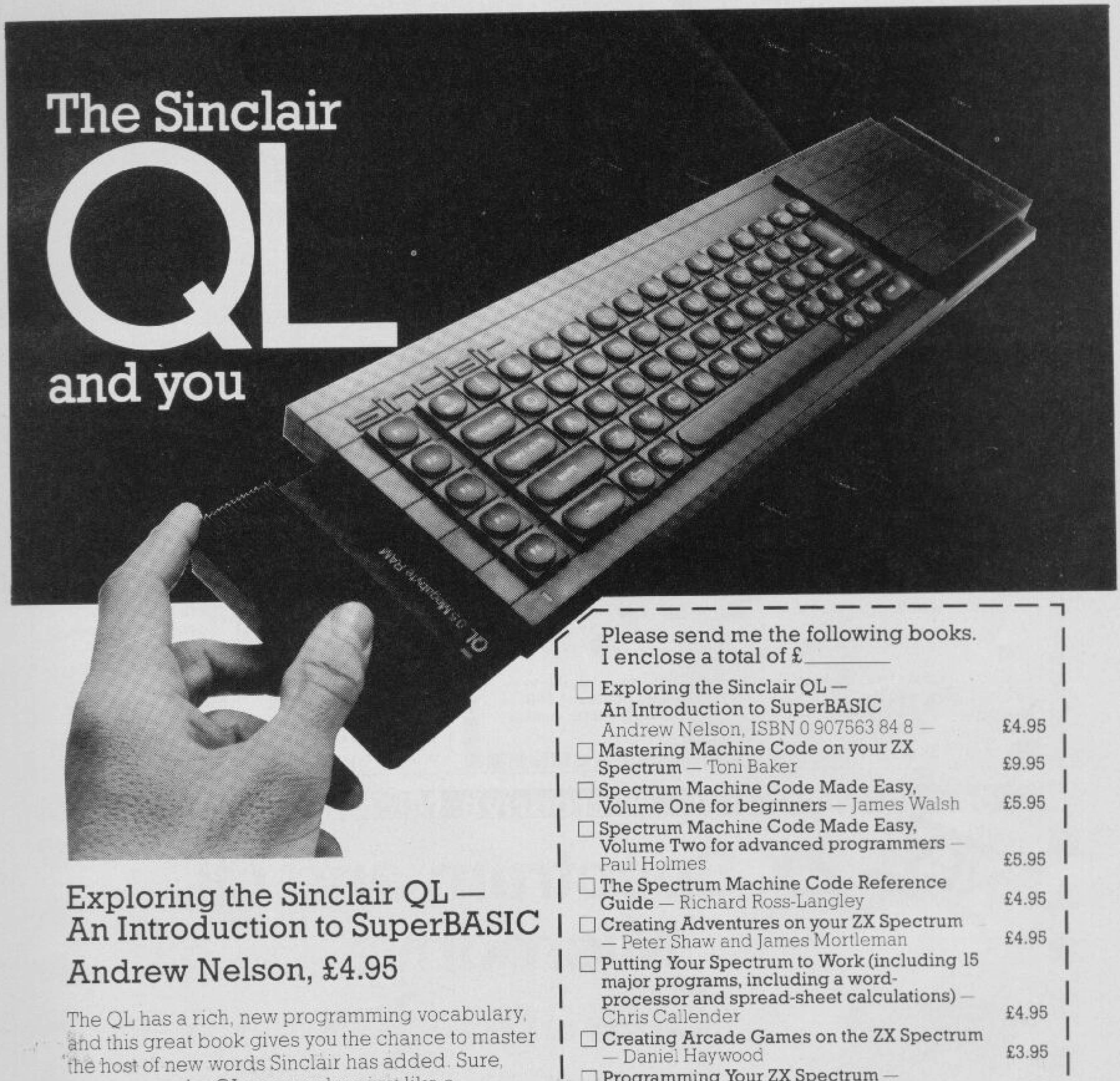
The documentation explains that the language implementation is not intended to teach FORTH, but only to show how it runs. The booklet accompanying Computer One's *QL-Pascal* makes the same disclaimer about not being intended to teach Pascal. But working through the clearly-outlined example programs will certainly introduce you to many aspects of the language and its operational demands.

QL-Pascal is menu-driven and there's a 'help' window to prompt you whenever data input is required. The compiler produces compact intermediate code which is interpreted when the program is run. Complete with a full-screen editor, it's a fairly comprehensive version of the language plus various QL-specific extensions.

QL-FORTH is £29.95 and *QL-PASCAL* is £39.95. Computer One is at Science Park, Milton Road, Cambridge CB4 4BH.

Tim Hartnell

The Sinclair QL and you



Exploring the Sinclair QL — An Introduction to SuperBASIC

Andrew Nelson, £4.95

The QL has a rich, new programming vocabulary, and this great book gives you the chance to master the host of new words Sinclair has added. Sure, you can use the QL more or less just like a Spectrum, but if you do, you are missing the extraordinary power which lies behind the radical concepts of SuperBASIC. Command by command, statement by statement, Andrew Nelson takes you through the richness of QL SuperBASIC in *Exploring the Sinclair QL — An Introduction to SuperBASIC.* Just £4.95 and available from most book and computer shops. In case of difficulty, you can order it directly from Interface Publications, using the coupon below. (Trade only: Interface Publications are distributed exclusively in the UK and Eire by W H S Distributors. Export orders handled by Interface Publications.)

Interface Publications, Department QYS,
9-11 Kensington High Street, London W8 5NP.

Please send me the following books.
I enclose a total of £________

☐ **Exploring the Sinclair QL — An Introduction to SuperBASIC** Andrew Nelson, ISBN 0 907563 84 8 —	£4.95
☐ **Mastering Machine Code on your ZX Spectrum** — Toni Baker	£9.95
☐ **Spectrum Machine Code Made Easy, Volume One for beginners** — James Walsh	£5.95
☐ **Spectrum Machine Code Made Easy, Volume Two for advanced programmers** — Paul Holmes	£5.95
☐ **The Spectrum Machine Code Reference Guide** — Richard Ross-Langley	£4.95
☐ **Creating Adventures on your ZX Spectrum** — Peter Shaw and James Mortleman	£4.95
☐ **Putting Your Spectrum to Work (including 15 major programs, including a word-processor and spread-sheet calculations)** — Chris Callender	£4.95
☐ **Creating Arcade Games on the ZX Spectrum** — Daniel Haywood	£3.95
☐ **Programming Your ZX Spectrum** — Hartnell/Jones	£6.95
☐ **60 Games and Applications for the ZX Spectrum** — David Harwood	£4.95
☐ **Beyond Simple BASIC — Delving Deeper into your ZX Spectrum** — Dilwyn Jones	£7.95
☐ **Instant Spectrum Programming (tape and book)** — Tim Hartnell	£4.95
☐ **20 Simple Electronic Projects for the Spectrum** — Stephen Adams	£6.45

Name..

Address..

....

QYS

INTERFACE
PUBLICATIONS

We're the experts!

AVALON OFFER — SAVE £1!



Hewson Consultants has been pretty chuffed with the response it's had to *Avalon* — but its records show conclusively that one or two of you haven't actually invested in a copy as yet. Well, maybe the seasonal spirit hasn't died down just yet or whatever, but Hewson Consultants has decided to allow readers of *Your Spectrum* the exclusive opportunity to buy *Avalon* for £6.95 — instead of the usual £7.95!

Simply fill in the form below (or a photocopy of same) and send it off to Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon, Oxon.

GO TO PAGE 42 ...

... to win a Saga keyboard in our Avalon competition!

Being a tight-fisted reader of *Your Spectrum*, all you're going to get out of me is a measly cheque/Postal Order for £6.95. Please send me a copy of *Avalon*! 'Tis the season to be miserly!!

Name ....

Address ....

....

.... Postcode ....

Complete the above form, enclose a cheque/Postal Order (made payable to Hewson Consultants) for £6.95 and send it off to Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon, Oxon. If you don't want to mutilate your issue, send a photocopied form instead!

CHEAP TRILOGIES

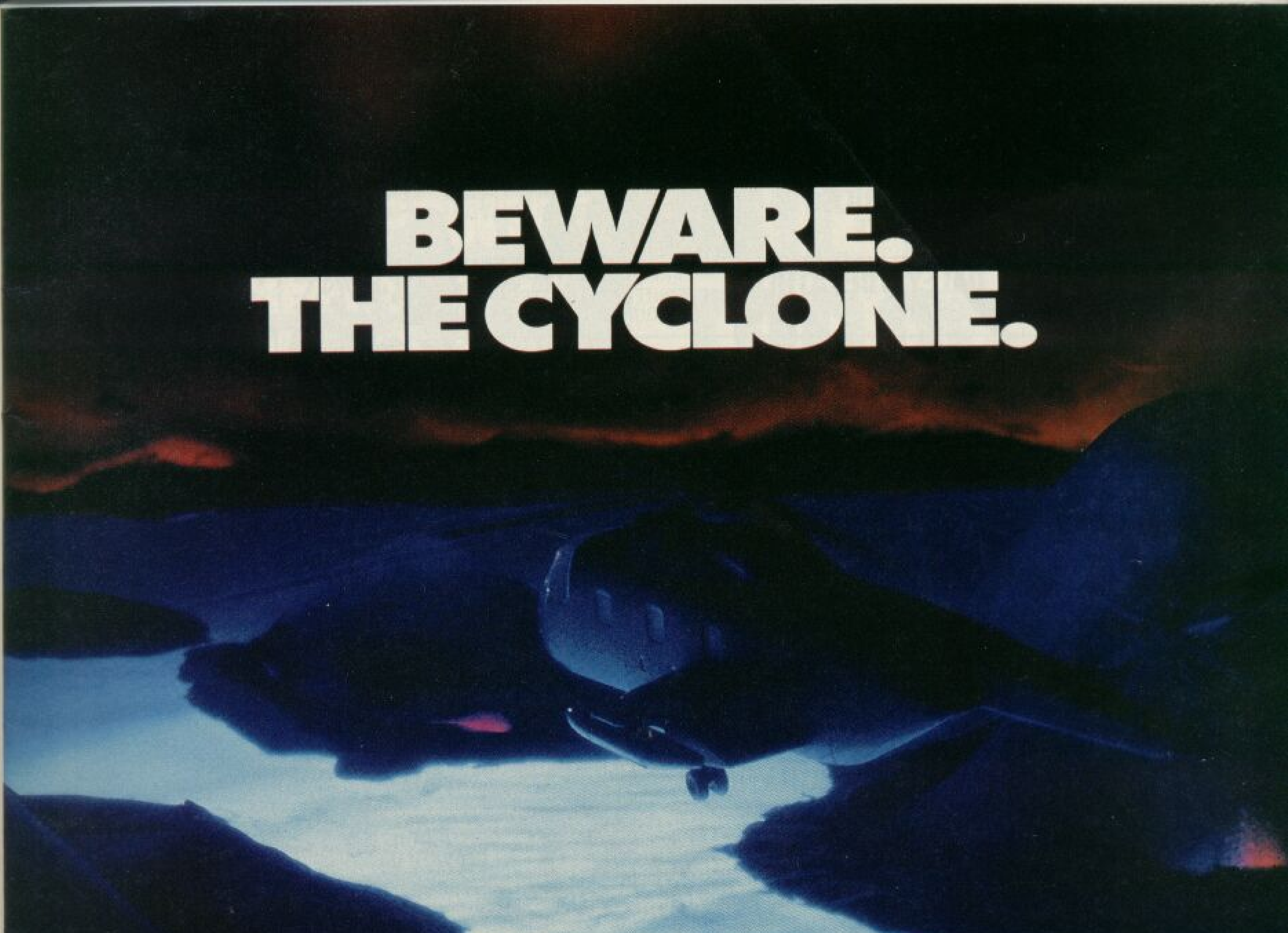


Packing 'em in! Special Xmas presentation packs from Incentive Software.

Re-packaging games is definitely 'flavour of the month', especially with Christmas looming on the horizon. One more company who've succumbed is Incentive Software by including all three of its *Ket Trilogy* adventures in a presentation pack.

And if the thought of saving £3.55 doesn't send your pulse racing, there's a whole load of prizes to be won, such as a video recorder and the title 'Britain's Best Adventurer' (*Wow! Ed.*). All you have to do is score 100 per cent (!) on all three games, thus revealing the three-part secret message.

The IS press release claims a number of 'special' features such as 'interactive beings', 'on-screen scoring' and a 'unique fast-response combat system' — but it *must* be more exciting than that! Check 'em out in your nearest stockists.


BEWARE.
THE CYCLONE.

YS TOP TWENTY CHART

THIS MONTH	LAST MONTH	MONTHS IN CHART	TITLE / PUBLISHER	COMMENT
1	2	5	**SABRE WULF** ULTIMATE	BACK IN THE POLE POSITION ONCE AGAIN, BUT WHAT DO YOU THINK OF **UNDERWURLDE?**
2	NEW	1	**DALEY'S DECATHLON** OCEAN	'ARMCHAIR OLYMPICS' DEFINITELY SEEM TO BE THE FLAVOUR OF THE MONTH.
3	1	8	**JET SET WILLY** SOFTWARE PROJECTS	WHERE WOULD THE CHARTS BE WITHOUT THIS ONE?
4	5	7	**TRASHMAN** NEW GENERATION	**TRASHMAN**'S STILL A FIRM FAVOURITE WITH THE FANS, BUT IT LOOKS LIKE **TRAVEL WITH TRASHMAN**'S DESTINED FOR THE TOP.
5	15	3	**MATCH POINT** PSION	PSION SCORES AN ACE WITH THIS UNSEASONAL WIMBLEDON TENNIS SIMULATION.
6	10	5	**LORDS OF MIDNIGHT** BEYOND SOFTWARE	YOU VOTED **THIS** TOP ADVENTURE OF THE MONTH! C'MON ALL YOU **HOBBIT** AND **VALHALLA** FANS, DON'T LET THEM BRING YOU DOWN.
7	4	8	**ATIC ATAC** ULTIMATE	LOSING GROUND FAST, **ATIC ATAC** LOOKS SET TO DROP OUT OF THE CHARTS — IT HASN'T GOT A CHANCE!
8	NEW	1	**FIGHTER PILOT** DIGITAL INTEGRATION	HAVEN'T SEEN THIS ONE FOR A WHILE ... BUT IT'S BACK INTO THE TOP TEN LIKE A BULLET.
9	14	5	**WORLD CUP** ARTIC	ALL IT TOOK WAS THE FOOTBALL SEASON TO START AND THIS ONE TOOK OFF WITH IT.
10	NEW	1	**MONTY MOLE** GREMLIN GRAPHICS	'SUPPOSED' CONTROVERSIAL GAME, DUE TO ITS NON- EXISTENT REFERENCES TO THE MINER'S STRIKE.
11	11	5	**MUGSY** MELBOURNE DRAW	GANGSTER THRILLS FROM THE MELBOURNE HOUSE MOB!
12	19	2	**TLL** VORTEX	DID YOU KNOW THE COMPANY'S JUST RELEASED A SIMILAR GAME BASED ON HELICOPTERS?
13	7	8	**CHEQUERED FLAG** PSION	THE RACE IS STILL ON .. BUT IT LOOKS LIKE THIS ONE'S BLOWN ITS GEARBOX. **CHEQUERED FLAG** REVS UP ITS ENGINE ONLY TO FIND OUT IT'S IN REVERSE.
14	8	7	**LUNAR JETMAN** ULTIMATE	LOOKS LIKE EVERYBODY'S PLAYING **KNIGHT LORE** AND NOT BOTHERING ABOUT THIS GAME ANYMORE.
15	NEW	1	**KOKOTONI WILF** ELITE	WOW, WHERE'D THIS ONE SPRING FROM?
16	NEW	1	**SHERLOCK** MELBOURNE HOUSE	WE HAD A SUSPICION THIS ONE WOULD HIT THE CHARTS! BUT WHAT ABOUT **HAMPSTEAD?**
17	NEW	1	**FULL THROTTLE** MICROMEGA	MICROMEGA GETS ON ITS BIKE AND STARTS REVVING UP ITS ENGINE TO SPEED UP THE CHARTS.
18	9	7	**WHEELIE** MICROSPHERE	WHAT'S ALL THIS NONSENSE ABOUT DOUBLE DECKER BUSES AND MANIC HEDGEHOGS? WELL, YOU LOT OBVIOUSLY DON'T CARE .
19	NEW	1	**PSYTRON** BEYOND SOFTWARE	A NEWCOMER TO THE CHARTS — IT'S YOUR TASK TO BLAST THE ALIEN NASTIES FROM THE SPACE STATION.
20	13	3	**THE HOBBIT** MELBOURNE HOUSE	THIS COULD BE THE LAST TIME YOU SEE THIS ADVENTURE IN THE CHARTS.

JOHN HALLET

THE YS TOP 20

Well, by the time you read this, lots of you will have received all sorts of software goodies from Santa — and we want to be first in line to hear all about it. Remember this is your chart — as long as you keep telling us what *you* think is the best software around! Letters from software houses containing personal cheques will not be accepted (*Unless they're for* exceptional *amounts of moolah! Ed.*).

Of course, there's a chance you could be the lucky winner of three pieces of Spectrum software — all you have to do is to will your letter first out of the Editor's hat when we come to count up the votes. This month's winner is Mark Frankland of Theydon Bois, Essex — nice one, Mark!

As usual, you've to send us the coupon below, complete with your top five fave raves, as well as your top three turkeys (which will be used to throw together a Top Turkey chart for 1985!). (*Er, excuse me, are you talking about the precise art of constructing an article for a future issue, tosh? Ed.*)

Post off your entries to YS Charts, *Your Spectrum*, 14 Rathbone Place, London W1P 1DE.

YOUR SPECTRUM

THE YS TOP 20 READER POLL

My top five raves on the Speccy are:

1 ____
2 ____
3 ____
4 ____
5 ____

My three top turkeys on the Speccy are:

1 ____
2 ____
3 ____

Name ....
Address ....
....
.... Postcode ....

I understand that when this chart was tested — eight out of ten owners said their Spectrums preferred it. (*What? Ed.*)

Send your completed coupon post haste to:

YS TOP TWENTY, YOUR SPECTRUM, 14 RATHBONE PLACE, LONDON W1P 1DE.

FORUM

Witty, intelligent and imaginative readers write to Forum, Your Spectrum, 14 Rathbone Place, London W1P 1DE. So why haven't we heard from you yet?

ERROR CODE

I have just built the Centronics interface, as described by John Flenley in *YS* issue 6. (I've even used this and a version of his software (*YS* issue 7) to write this letter.) However, before anyone else tackles this project, it's important to bring your reader's notice to a couple of errors in the software.

The first is to do with the relocatability of the code. It has a BREAK function which John treats as a subroutine; unlike other 'calls' the address is not adjusted during the M/C loading process — thus, it'll only work while the original un-relocated code is still intact.

The solution is only really open to those of us who can use assembly language, but it can be tackled in two ways: add another adjusting 'paragraph' to the loader, or do what I did — edit the program so the BREAK is part of the main program (it was only called once anyway).

The other program is the I/O address of the interface. It's consistently quoted as being at 223, wheras making the hardware exactly as shown in *YS* issue 6 gives it a range of addresses, of which the highest below 256 is 63! Specifically, the interface will react to any I/O address with bits 6 and 7 LOW.

Once again the solution is easy for those of us with assembly langauge, but there's a tedious alternative for those using the Hex number dump. Look for the three occurences of 'DF' near the middle of the list (the first is preceded by 'DB', the others by 'D3') and replace them with '3F'. Then, adjust the checksums for those LINES; the first must be 'DD', the second '59' and the third '33'.

I enjoyed the experience of the project — I can't agree with some aspects of the software (I've re-written parts of it) but you can put that down to rivalry between programmers!

Mike Minchin, London

Thanks Mike, it's good to know that you've got the project up and running. If anyone's got any queries on this project, please write to John Flenley, c/o Your Spectrum, *14 Rathbone Place, London W1P 1DE. Ed.*

A TIP FOR THE HIP

With reference to *From The Hip, YS* issue 8, Troubleshootin' Pete's reply to David Williams about memory left was miles too complicated.

Whilst avidly studying my copy of *The Complete Spectrum ROM Disassembly* for useful routines, I came across page 103 (*It's usually after page 102. Ed.*) which includes a 'free memory' subroutine; it's used to see if there's enough room for whatever task the Spectrum is carrying out, such as loading a program. The subroutine is used in the following format:

```
PRINT 65536 - USR 7962
```

This'll give the number of free bytes left in a 48K machine; I suspect that if you 'PRINT 32768' in the above format, you'll be given the free memory for the 16K Speccy. I reckon that's much neater than all that PEEKing stuff that Pete suggested.

MJ Adams, Wolverhampton

Point taken Mr A, but my method avoided the confusion over whether you're using a 16K or 48K machine. Still, I reckon you deserve a Bronze Trainspotter award for your efforts. Troubleshootin' Pete.

FROM THE CAP!

OK Troubleshootin' Pete, sit up and listen 'cos this letter's gonna be the best thing that's happened to you since my last one!

With regard to your *From The Hip* column in *YS* issue 9, I'm pleased to say you've actually got something right for once. Your knowledge of the Spectrum's ROM *is* next to useless. Whilst the ROM routine at 6683d does indeed print the contents of the BC register pair, it'll only do so correctly for numbers below 10,000 (this is because its proper use is in printed Basic line numbers). To print *any* number in BC you'll have to call first STACKBC (11,536 decimal and 2D2B Hex) and then FPPRINT (11,747 decimal and 2DE3 Hex). The first of these routines stacks the contents of BC in floating point form, whilst the second prints the last entry on the calculator stack. Got that? Good.

Moving on to another topic ... one of the biggest problems facing games programmers using Basic is the refusal of the Spectrum's SCREEN$ function to recognise UDG characters. Well, good news! The following line will return the variable 'a' with the CODE of the UDG at (y,x) on a 48K Spectrum:

```
POKE 23607,252: LET a=CODE
SCREEN$ (y,x)+102: POKE 23607,60
```

Thus, 'CHR$a' will be the character at (y,x). I'll leave you to figure out how this works and to show your rabbleship (sorry, readership) what to do if they've only got a derisory 16K under their keyboard.

Now, if you'll excuse me, I really must go and rescue Alpha-Centauri before it plunges into that nasty black hole thingy ...

Captain Critical, Dartford, Kent

PS. Please let me know of anyone I've forgotten to insult. Oh yes, and I suppose I might just help you out on my second point if you *really* can't fathom it out for yourself.

Ugh! If there's one thing I can't stand ... it's a clever dick. And I think the less we hear about 'that nasty black hole thingy' the better! Troubleshootin' Pete.

WHAT'S NEW?

Thank you for the interesting article on the ZX Spectrum+. So much for Mr Searle's disingenuous denials of this 'new' machine's existence ... Well, I suppose it makes a change from Sinclair Research announcing a new computer and then not releasing it for six months or so!

In the same issue, Troubleshootin' Pete (in answer to Partick Fox's letter on Ian Beardsmore's *Crash Theory*) states that "the Spectrum doesn't do a normal NEW, it performs a system reset which has the same effect as pulling the plug ...". The Spectrum NEW is unusual in *some* ways, but the above description isn't quite accurate; it's not identical to pulling the plug (although this can be simulated by RANDOMIZE USR 0) as NEW does protect some memory areas above RAMTOP. Try the following as direct commands:

```
POKE USR "a", 255
PRINT G "A"
NEW
PRINT G "A"
RANDOMIZE USR 0
PRINT G "A"
```

This illustrates that the NEW created from Ian's *Crash Theory* is halfway between a normal NEW and a system reset.

John Kinory, London

Thanks a lot for clearing that up, John. And if Patrick Fox wants to write in and tell us that it's not halfway, but actually five-eighths of the way between a normal NEW and a system reset, we're not interested! Troubleshootin' Pete.

LET'S BE MODEST ...

By all the Siberian elephants in Ashby-de-la-Zouch, you at the fine establishment of *YS* are incredible!!

On October 22nd I picked up a brilliant copy of issue 9 and paid my 85p (inc VAT) and in two hours I had read it from cover to cover, forwards and backwards (through enjoyment) and my tiny brain went into a fascinated trance at your *Speccy+* article. Still in a hazy coma, I wandered down to deep, dark Lewisham WH Smiths where, lo and behold, was the one and only SPECCY+!! What's more, it was exactly as you'd predicted!!

I've figured you're either amazing, psychic, or have a spy deep in the heart of Sinclair Research!

Thomas 'Erauqs' Smith, Lewisham

Actually it was just a lucky guess! Hang on though, my psychic powers tell me that we've printed one of your letters before ... issue 9, unless the vibrations I'm getting are right out!! C'mon you lot out there, this man's had two letters printed and we've not heard from you yet!! Ed.

LEADING QUESTIONS

In *Forum, YS* issue 4, there's a letter from a Mr Ritman explaining that the lead connections on Interface 1 are apparently wired back to front. My own problem is that in making up a lead for an RS232 printer (the Brother M-1009) as opposed to RS232 communications between computers, should I follow the





Sinclair Research convention of naming the leads or reverse them as per Mr Ritman's letter? At present I am having trouble getting the printer to print anything; most of the time, the screen border goes black and nothing happens at all!

The printer 'D' socket are:

PIN NO	NAME
2	TXD
3	RXD
5	CTS
7	OV
11/20	SCA/DTR

Is it necessary to wire up all these pins?

There seems to be a lot of confusion regarding the RS232 'standard'. Perhaps you would consider doing another article on the RS232 with special reference to connecting up printers and perhaps a screen dump routine as well.
Alastair McIntyre, Glasgow

Sorry Alastair, I've never wired up the Brother M-1009 and I've no idea of the answers to all your questions. However, here's hoping that someone out there can help us — please! Troubleshootin' Pete.

HIT OR MISS?

Every month I've unfailingly bought your splendid magazine and enjoy every penny's worth of information. Issue 9, however, caused me to consider a pair of SPECtacles when I read *Joystick Jury.*

It seems to me that someone has forgotten how to count. How can Roger give *Full Throttle* '4/5' and a 'HIT' and then given *Alcatraz Harry* '4/5' but a 'MISS'? The same goes for David's views on *Alcatraz Harry* and *The Perils of Bear George.* Even Ron has made a boob — he gives *Terrahawks* '2/5' and a 'MISS' and *River Raid* '2/5' and a 'HIT'.

One of us, it appears, has got it wrong ... haven't we? Seeing as I have no connection with *YS* it can't be me, can it?
Nicholas Monte, Kidderminster

Yes, it's perfectly true I have no connection with Nicholas whatsoever (your cheque's in the post, Nick). Seriously though folks, it may look funny ... but our Joystick Jury *marks are much more revealing than your average '87% use of machine' sort of comment. Harking back to the early sixties, there was a program on TV called* Jukebox Jury, *in which a panel of personalities listened to a single and gave it a mark out of five on a personal level; they'd then have to decide whether it would be a 'HIT' or a 'MISS' in the charts. And that's all we've done! Each of our reviewers give it a personal rating, and then decide whether it'll be successful — which, when you think about it, are two completely different factors. Everything else about the program, you'll read about in their respective reviews. What do you think? Ed.*

CHEETAH COMPO CODE

```
  1 DATA "QL"             28 DATA "COMPUTER"
  2 DATA "ZX"             29 DATA "CASSETTE"
  3 DATA "RAT"            30 DATA "CONQUEST"
  4 DATA "BIT"            31 DATA "SINCLAIR"
  5 DATA "ROM"            32 DATA "HARDWARE"
  6 DATA "RAM"            33 DATA "BATATTACK"
  7 DATA "BUS"            34 DATA "INTERFACE"
  8 DATA "TAPE"           35 DATA "CARTRIDGE"
  9 DATA "PORT"           36 DATA "DRAGONFIRE"
 10 DATA "BYTE"           37 DATA "BEARGEORGE"
 11 DATA "CHIP"           38 DATA "MOONSWEEPER"
 12 DATA "BAUD"           39 DATA "SWEETTALKER"
 13 DATA "CP/M"           61 DATA "BUSCOYCOMPUTERW"
 14 DATA "DRIVE"          62 DATA "AERATYRUHATEEHC"
 15 DATA "BASIC"          63 DATA "UIOSOPDOASDPFGH"
 16 DATA "EPROM"          64 DATA "DHJSMAROMJEVIRD"
 17 DATA "CLIVE"          65 DATA "EJREKLATTEEWSKL"
 18 DATA "SYNTAX"         66 DATA "GLZTQXGCWVMTBNM"
 19 DATA "BUFFER"         67 DATA "RATTMQOSPECTRUM"
 20 DATA "MEMORY"         68 DATA "OKQEWENYIECRTOT"
 21 DATA "CHEETAH"        69 DATA "ECYUIOFNONPIASP"
 22 DATA "PROGRAM"        70 DATA "GIDMONITORCXSFH"
 23 DATA "MONITOR"        71 DATA "RTHMJKRALZCLZAV"
 24 DATA "MACHINE"        72 DATA "ASEXBNEXPIHCATB"
 25 DATA "SOFTWARE"       73 DATA "EYNPMECAFRETNIO"
 26 DATA "SPECTRUM"       74 DATA "BOERAWTFOSETYBR"
 27 DATA "JOYSTICK"       75 DATA "RJTTATEERAWDRAH"
```

This is the data required for the main part of the program below. Lines 1-39 contain the possible words you're looking for, and lines 61-75 make up the wordsquare itself.

```
 100 LET dif=0: LET total=0
 110 CLS : RESTORE :                          REM P
rint words
 120 FOR n=1 TO 39
 130 READ n$
 140 PRINT AT 15+n-6*(n>6)-6*(n>12)-21*(n>18),5*(
n>6)+6*(n>12)+8*(n>18);n$
 150 NEXT n
 160 DIM a$(15,15):                     REM Print w
ordsquare
 170 FOR a=1 TO 15: READ a$(a)
 180 PRINT  PAPER 6;AT a,1;a$(a)
 190 NEXT a
 199 REM search 1.letter
 200 FOR n=1 TO 39: LET found=0
 210 RESTORE n: READ n$: PRINT  FLASH 1;AT 15+n-6
*(n>6)-6*(n>12)-21*(n>18),5*(n>6)+6*(n>12)+8*(n>1
8);n$
 220 LET len=LEN n$: LET l=len-1
 230 FOR b=1 TO 15: FOR a=1 TO 15
 240 IF n$(1)<>a$(b,a) THEN  GO TO 300
 250 FOR h=-1 TO 1:                     REM h=horiz
ontal direction
 255 IF h=-1 AND a-1<1 THEN  GO TO 280
 256 IF h=1 AND a+1>15 THEN  GO TO 290
 260 FOR v=-1 TO 1:                     REM v=verti
cal direction
 264 IF v=-1 AND b-1<1 THEN  GO TO 280
 265 IF h=0 AND v=0 THEN  GO TO 280
 266 IF v=1 AND b+1>15 THEN  GO TO 280
 270 GO SUB 500: REM Search rest
 280 NEXT v
 290 NEXT h
 300 NEXT a: NEXT b
 310 LET dif=dif+found: PRINT  BRIGHT found;AT 15
+n-6*(n>6)-6*(n>12)-21*(n>18),5*(n>6)+6*(n>12)+8*
(n>18);n$
 320 NEXT n
 330 PRINT £0;AT 0,0;dif;" different words found.
"'total;" words in all."
 340 PAUSE 4e4: STOP
 500 REM Search--subroutine
 550 FOR t=1 TO 1
 560 LET x=a+h*t: LET y=b+v*t
 570 IF n$(1+t)<>a$(y,x) THEN  RETURN
 580 NEXT t
 590 LET total=total+1: LET found=1:   REM Found
 600 PRINT  FLASH 1; BRIGHT 1;AT 15+n-6*(n>6)-6*(
n>12)-21*(n>18),5*(n>6)+6*(n>12)+8*(n>18);n$
 610 FOR q=1 TO 5
 620 FOR t=0 TO 1
 630 LET x=a+h*t: LET y=b+v*t
 640 PRINT  BRIGHT 0;AT y,x;n$(1+t)
 650 BEEP .01,x-2*y
 660 PRINT  BRIGHT 1;AT y,x;n$(1+t)
 670 NEXT t
 680 NEXT q
 700 RETURN
9000 SAVE "cheetah" LINE 9020
9010 VERIFY "cheetah"
9020 CLS : PRINT AT 6,5;"CHEETAH COMPETITION"
9030 PRINT AT 10,2;"WORDSQUARE SOLVING PROGRAM"
9040 PRINT AT 14,14;"BY"
9050 PRINT AT 18,3;"Finn Hansen,Skovbakken 32"
9060 PRINT AT 20,7;"DK 6700 Esbjerg"
9070 PAUSE 200: GO TO 1
```

This portion of the program accesses each of the words in lines 1-39 and compares them to the data statements in lines 61-75. Thanks also to Anthony Jackman for his program.

CHEETAH CHEAT

When I came across the *Cheetah Competition* in *YS* issue 9, I thought 'Why not let the Speccy do all the work?'. So here's my modest program to find all the words in the wordsquare; no doubt your readers will want to speed it up and so on, but it does work!

Heaving reached the frightening age of 48, I feel I ought to have had a group of my own in your competition!
Finn Hansen, Skovbakken 32, DK 6700 Esbjerg

Hah, that's nothing ... there are days when I leave the YS *office feeling like I'm about 148 years old! Ed.*

STICKING WITH DK

I've just finished reading issue 8 of *Your Spectrum* and in your review of *TLL*, Dave Nicholls states that it's impossible to use the Kempston joystick without doing a MERGE "" and adding a few lines of code.

Hah! I've found that if you've got a Dk'Tronics interface with a dual port, the first port simulates the necessary keys for it to work with *TLL*. What do you think of that?
BR Pell, Wellingborough. Northants

Not much ... But then users of the new TLL *will be able to use their Kempston joysticks anyway — so you can forget about Dave's 'sticky' code. Watch out for more TLL POKEs in* Hacking Away. *Ed.*



We apologise for the lack of Hard Core *in this month's* Frontlines *— but deadlines being what they are, Trevor Marchant was due to deliver his words of wisdom just as the first letters started pouring in. For hardware hints on the Spectrum, or any of its peripherals, contact Trevor Marchant,* Your Spectrum, *14 Rathbone Place, London W1P 1DE.* YS

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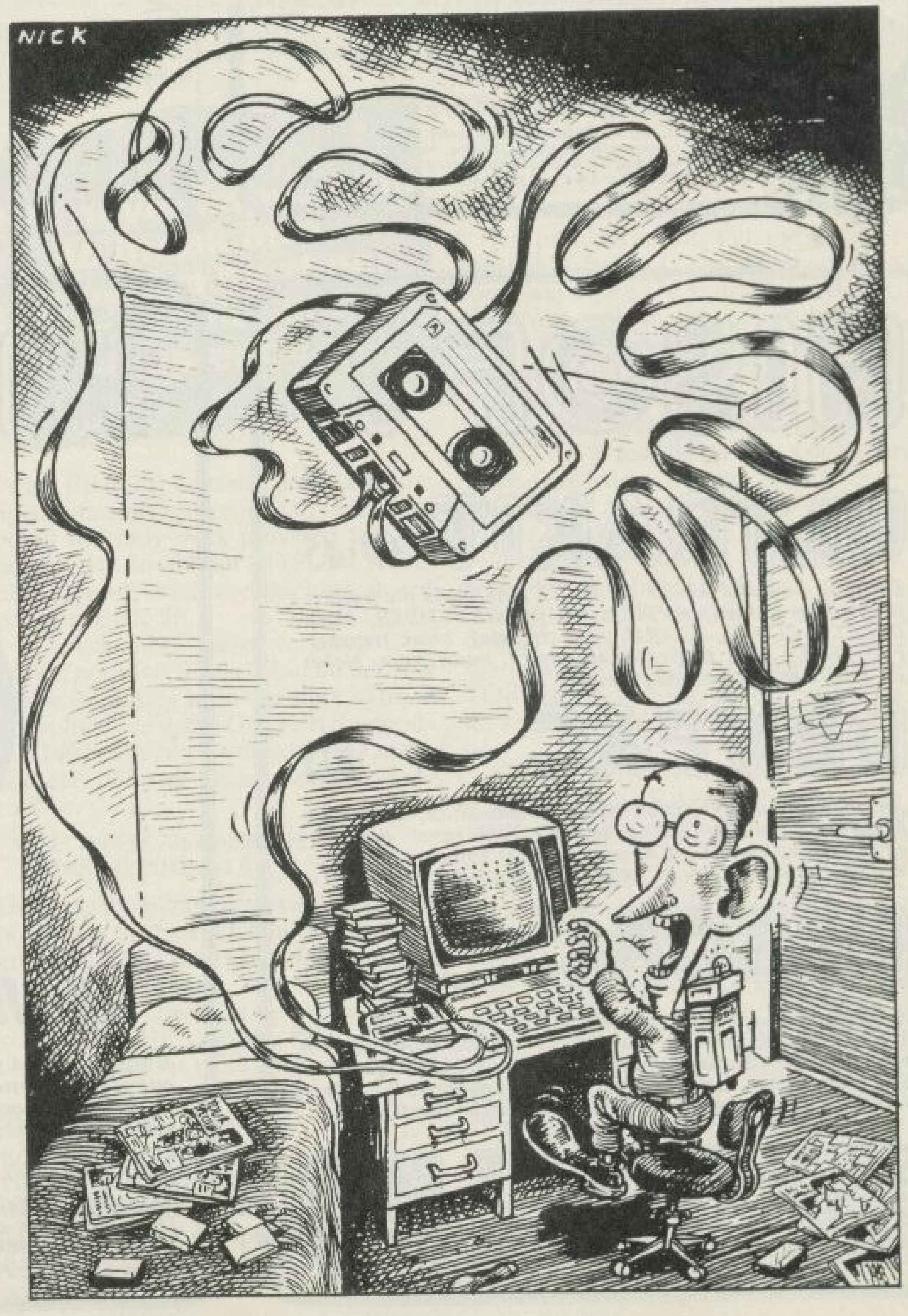
CODEBUSTERS

HEADING FOR TROUBLE

Continuing his codebusting theme, Terry Bulfib delves deeper into the loading methods used to 'protect' commercial software from the prying eyes of hackers. This month, he takes a look at programs claiming to be 'headerless'.

If all you're looking for in this article is a foolproof method of breaking into any software package and then copying it for all your mates, I'm afraid you're going to be upset. Software piracy is both illegal and immoral, and there's no way that I or this magazine can condone it ... under any circumstances.

That said, under the copyright laws of this fair country, it's perfectly legal to make a copy of work for the purposes of private academic study ... and that's all we're proposing here. The only stipulation is that you mustn't use your copy for any other purpose than private study, or pass it on to your friends. There's no legal or moral objection to breaking the protection on a program in order to examine the programming methods, make alterations or just show off your programming prowess.



NICK DAVIES

LOSING YOUR HEAD

Keeping the above firmly in mind, let's move on to the concept of loading a computer program from tape. Basically, to load anything at all, the computer must be told the start address and the length of the load, and what type of load it is (Basic or bytes). Usually, this information is in the 'header' which precedes each program, saved in the normal way. This makes things too easy for the hacker though, and hence the popularity of the 'headerless' load; however, the computer still needs to know this information, so it has to be told in another way. This is done with a short piece of machine code which puts the information into the appropriate Z80 registers and then calls the routine in the ROM which performs the load. The piece of code must be present for the headerless load to work. If you can't find it, then you're looking in the wrong place!

Sometimes the code will have a false header, one which is there only to mislead you. The loading program will have

two machine code loading routines, the first of which is just there to throw away the header; the second can then load the code to a different address. Very droll.

The simple way of dealing with the headerless load is to tack a header of your own manufacture on to the front of it. To do this you'll need to know the start and length numbers, and they'll be somewhere in the loader program. They *have* to be, so keep looking. Have a look at the example code with this article — it should look something like that.

There may be a great deal more code in the loader, but there cannot be less. It might check that certain bytes in the Basic have not been messed with, or it may load the registers from some address the Protection Artist (PA to you, John!) reckons you may have disturbed by breaking in. If you make a mistake, don't tell anyone about it and get laughed at — just try again, dummy, until you can brag about what a wizard you are.

If the PAs are feeling clever, they'll ring some changes in this fairly straightforward routine. For instance, the jump address may be pushed on to the stack and jump to the ROM routine instead, which will cause the routine to return from the ROM to the address on the stack. Perhaps the code is made to load over the top of the jump address, changing it to something else. It could even be arranged for the code to load over the stack, changing the return address stored there by the call instruction. Protection artists like to think they're smart, so watch for that extra wrinkle.

If it looks like there's just a simple jump to the M/C program on return from the load, then you could substitute an address of your own, one that goes somewhere safe (1303 Hex is worth remembering) or perhaps a little routine to un-set all the bombs first.

FAST AND FURIOUS

The headerless load may not be headerless, it may be loaded by a special routine — a fast loader perhaps — rather than using the Spectrum ROM. In this case you have a program loading a program to load a program. The way in is the same. The first LOAD *has* to use the standard Spectrum ROM routines.

That's the 'fast', but 'furious' is you when the fast load fails for the fifth time running. This is one that won't respond to a false header, because the actual tones on the tape are different from the standard format. Most of these fast loaders (and the saving routines for that matter) are pinched from the Spectrum ROM. Talk about piracy! All that's changed is the delay in the timing loops and sometimes the border colours. In fact, you may find that the routine calling the fast load routine is just like the code above for the headerless load. That's a useful landmark.

To get the main program aboard, you'll have to use the fast load routine ... nothing else will read the tape. But first you'll want to re-write the fast load a little, so you keep control. The principle of such a fix is the same as for the headerless load, and the fast load routine will be loaded in a way that's protected by the same methods as the headerless loader.

DANGER UXB

There are two popular bombs which most people know about: POKE 23659,0 will allow no lines in the lower screen (so any error message will crash the machine) — so does 'Scroll?' and so will CLS. This limitation means the bomb is only good for very short programs. Imagine a program that could neither clear nor scroll the screen!

The other booby-trap is set by corrupting ERR SP at 23613 and 23614. The idea is to POKE in the address of a pair of bytes holding zero. With the power-up RAMTOP of 65367 it's usually sufficient to POKE 23613,0 and let 23614 ride. Then whenever there is an error (BREAK is an error condition) the computer will collect an address from the address pointed to by ERR SP — which should be in the stack — and jump to it.

It's never impossible to break into a program by sheer ingenuity and persistence . . .

Point ERR SP at some zeros and the Spectrum ends up jumping to reset. This bomb will only work provided you are prepared to do without GO SUBs. A GO SUB doesn't crash the machine, it just corrupts ERR SP.

A much more useful variation is to POKE not ERR SP itself, but the address that it's pointing to in the stack. This is not vulnerable to the GO SUB do-gooding. Instead of zeros, you could put in the address of your own machine code routine:

```
10 LET A=PEEK 23613+256*PEEK 23614:
   POKE A,0: POKE A+1,0
```

Defusing these traps is mostly a matter of not letting them be set. Don't let the program that does the POKEing run in the first place. However, the technique of LOADing a Basic program complete with the system variables as a block of code can also set these traps.

TOO MUCH!

Some programs LOAD in as many as six chunks. There were two companies who used the same method of multiple LOADs for a while, specifically to combat the copying programs which were selling so widely. These put small LOADs of just a few bytes into places where particular copy tapes kept their own info; the main program would check to see that these bytes where undisturbed before it would run.

The cleverest of these short LOADs would put a certain value into the systems variables FRAMES (which is changed every 50th of a second by the computer unless the interrupts are disabled); you can't do this from Basic. The LOAD routine in the RAM enables the interrupts at the end of a load, so FRAMES starts changing as soon as it's loaded. The main program can therefore easily tell if someone's been fiddling.

This is easily enough dealt with in machine code, but it's meant to stop copying only, and doesn't keep you out of the main program — I shall oblige you to work out your own methods.

WAY TOO MUCH!

One of the hardest things to deal with is the CODE LOAD which starts at the bottom of the screen and carries on right to the last byte of the memory. If you try to make such a recording yourself, you'll find that it crashed on loading it back in. The reason is you've loaded over the stack, and when the LOAD routine in ROM performs the return after LOADing, it takes the (in this case) wrong number from the stack.

The problem is that, with the whole of the RAM being LOADed, there's no room anywhere for your own routines. However, with luck, a short cut may work. It's a time-consuming short cut unfortunately, because each attempt requires about six minutes just for the loading time. What you do is change the RAMTOP to put the stack in a different place, then load as normal. The idea is to get a helpful address to LOAD on to the part of the stack that the ROM is using. While this approach is rather hit and miss, it does work. For a start, try two bytes (stack addresses are all two bytes, though RAMTOP can be even or odd) more or less than the standard RAMTOP, which is 65367 in 48K Speccys. I *do* know programs that this *does* work on.

Theoretically, this method must work if you guess the RAMTOP used by the saver, and there should be any number of happy accidents to be had. But why guess? Why not LOAD the first half of the code, screen and all, higher up than it's meant to go, say at 26384 instead of 16384. That helps you find the start of Basic which will then be at 33755 (you weren't trying to do this with Microdrives?). Then the RAMTOP in use at the time of saving can be found at 33730. Try loading with a RAMTOP a few bytes either side of that.

If this fails then you have to do a demolition and construction job. You can easily LOAD the first half of the CODE high up. Then you can get the far end of the code into the screen memory by loading the whole file higher up still (say

48000 or so) and letting it wrap around, loading past the end of memory, over the ROM and into the screen. It will, you know! SAVE the pieces and LOAD them all back together into a tame lump.

Naturally this is more trouble than it sounds, and you may need to use false headers and write your own headerless load routines to get things into the right places and stop code from lapping over into the system variables. But I reckon you're the sort of person who rises to a challenge, right?

WHEN ALL ELSE FAILS

As wetware (that's the organic based soft hardware you carry about within your cranium) ages, it gets tired more quickly. Mine does anyhow. At about 5am, I start making dumb mistakes instead of the clever ones I usually make. It's never impossible to break into a program by sheer ingenuity and persistence, but it can be a lot of work; a truly ingenious hacker avoids that particular four letter word.

So you may wish to consider cheating a little. That is, you may decide to cheat unfairly, using not brainpower, but the crude brute force of hardware. I refer, of course, to the SoftROM project in *YS* issue 2. Obviously it's much easier to get code aboard unprotected if you can subvert the ROM routines themselves. You could even re-write the reset routine to return you to Basic without wiping the memory, then a bomb would actually be a BREAK routine. This is advanced cheating not within the abilities of everyone; it will, however, give the beginner at skulduggery something to aim for.

LAST BIT

Well, that's it for now ... the rest is up to you. Messing about with code may be a little bit harder than attempting to crack the umpteenth level of any game — but you'll find it's much more rewarding. As I said last month, don't be discouraged by plying your new-found tricks of the trade on anything too difficult; pick a game that's a couple of years old and have a hack at that ... you'll soon get the hang of it.

One more thing before I take my leave. It's not clever to pirate software — not only is it dishonest (and get you into a lot of trouble to boot!) but it's also contributing to the high price of commercial games ... if the companies can afford to publish them in the first place that is! OK, soap box session over — but it *is* important. Remember, the only way to get more out of your Spectrum is to put more in — keep on hacking! YS

EXAMPLE LOADING PROGRAM

DEC	HEX	ASSEMBLER	COMMENT
221	DD	LD IX,????	Load IX register pair with the start address of the load.
33	21		
ANY	??		
ANY	??		
17	11	LD, DE,????	Load DE register pair with the length.
ANY	??		
ANY	??		
55	37	SCF	Set carry flag for LOAD (not VERIFY).
62	3E	LD A,FF	Indicates code not Basic.
255	FF		
205	CD	CALL 0556	Call loading routine in ROM.
86	56		
5	05		
195	C3	JP ????	Jump to actual M/C program.
ANY	??		
ANY	??		

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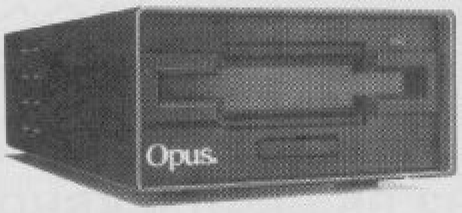
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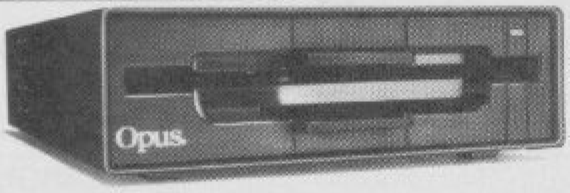
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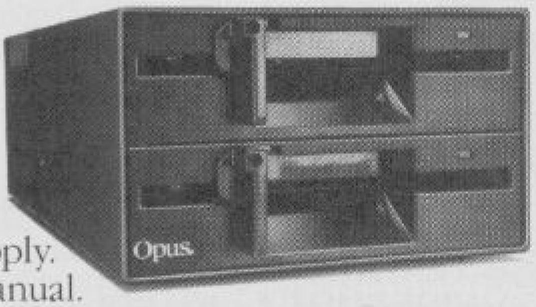
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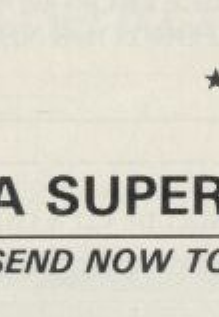
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TOUCH AND GO!

There've been several digitisers on the market for the Spectrum, but only the Touchmaster claims to be a keyboard replacement.* Henry Budgett *puts theory into practise — check out his findings ...



The end of the pencil ... or an expensive alternative?

We've seen a few digitisers around for the ZX Spectrum, but only one that's been promoted heavily as a replacement for the keyboard! The Touchmaster graphics tablet also claims to operate (with a suitable interface, of course) with almost all the current home computers.

UNDER PRESSURE?

Based on an A4-sized pressure sensitive membrane, the Touchmaster comes in a neat grey case measuring some 350mm by 330mm by 35mm. The back of the case is raised slightly so that it tilts the tablet to form a convenient drawing surface. All connections to the tablet are at the rear, and it's here that one of the differences between the Touchmaster and its rivals becomes obvious.

Power is supplied from a plug-in transformer and a single red LED shows that the power is on ... but there's no power switch fitted. Presumably, to allow the tablet to be used with as many home computers as possible, there are both parallel and serial interface sockets on the rear panel, together with an unex-

THE SOFT TOUCH

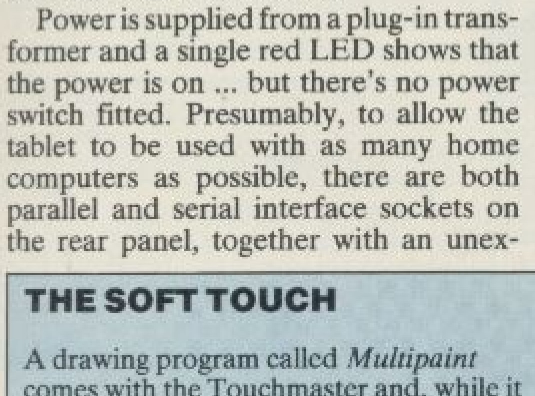
A drawing program called *Multipaint* comes with the Touchmaster and, while it *does* provide a demonstration of how software *could* elevate the device, it's not the best example.

You control the program from the tablet's surface; the only other time you need to use the keyboard is when you want to write on-screen or select a filename when saving or loading pictures. Providing a physical 'menu' of the facilities available, a plastic template fits over the top of the drawing surface; the right-hand edge of the template is marked with two columns of options and those currently selected are displayed in a status window at the bottom of the screen.

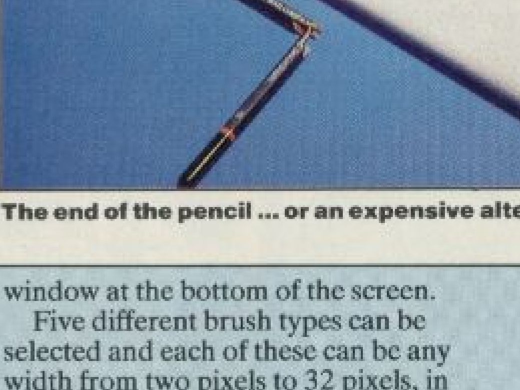
Five different brush types can be selected and each of these can be any width from two pixels to 32 pixels, in steps of two. Once you've selected the required colours and brush types, further options are available allowing you to create boxes, circles, polygons and 'rubber-banded' lines. Once created on-screen, the program offers the option of SAVEing to tape and then LOADing them back. Actually sketching the required design on the tablet is best achieved with a stylus (a suitable one is supplied with the Touchmaster) but a finger can be used instead.

Unfortunately, *Multipaint* offers no more than the most basic of features. A 'Fill' option is marked and documented but, certainly on the version I tested, it didn't appear to operate in the expected manner ... or, to put it another way, it didn't appear to work at all! Neither is there any facility for magnification or editing. But possibly the most obvious omission is the lack of any means of editing the screen — irrespective of the INK colours used. On an attribute-based system like the ZX Spectrum, where it's often easier to draw in black and white before adding the colours, this is an essential facility!

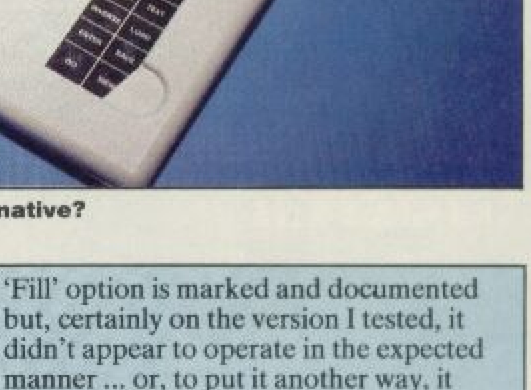
There's no way that *Multipaint* can be compared with something like *Melbourne Draw* because, although they're fairly similar, the latter does actually work!



Despite my complete lack of artistic flair, drawing freehand with the lightpen makes it comparitively easy to build up the beginnings of a landscape.



Creating some grass in the foreground, *Multipaint* allows line length to be altered in such a way as to simulate perspective.



I'm not sure what's gone wrong here ... but I think it's got more to do with the Spectrum's handling of graphics than a fault with the Touchmaster!

IAN MCKINNELL/PETER SHAW

plained socket for a 'foot switch' — should you want to play 'footsie' with the device, maybe? Whatever it's for, it's not mentioned in the accompanying hardware manual.

Using the same sort of membrane technology as ZX81/Spectrum keyboards, the tablet provides a 256 by 236 point resolution. The upper, carbon fibre, layer is held away from a lower resistive film by an insulating mesh. Thus, if you apply pressure to any point on the upper layer, the two layers are forced into contact; the actual pressure point is determined as a co-ordinate by a microprocessor built into the tablet that scans the top film in one direction while scanning the lower resistive film in the other. Once a point of contact has been established, the co-ordinate is relayed to the Spectrum via the parallel interface. (On a point of interest, it's worth noting that the Touchmaster's resolution is well below the Hi-res screen displays on several of the home computers it's available for; for example, it'll be impossible to resolve the Touchmaster's output to a single dot on the BBC Micro in Mode 0).

A plug-in interface is provided as part of the Touchmaster package to connect it up to the Spectrum. Along with a generous length of ribbon cable, the 'black box' interface unit contains a standard Z80 PIA chip; an extension connector is provided out the back of the unit for additional peripherals. The unit's definitely over-sized and projects far more that it needs to from the Spectrum's rear, but this is no doubt the result of using a standard box rather than poor design.

THE BITTER PILL

As a piece of hardware, the Touchmaster tablet would seem to have a lot going for it — especially when compared with its rivals like the Grafpad. It's built robustly and offers a full A4-sized drawing area that can be used for both drawing and the touch selection of menus. I suppose it could be considered an advantage that the Touchmaster, with new interface and software, would work with another computer — should you commit the cardinal sin of attempting to upgrade from the Spectrum (*Hah, no way! Ed.*).

It's a shame that the documentation should be so poor compared with the standard of the tablet itself; the hardware manual covers the connection of the tablet and provides a number of simple Basic programs to read co-ordinates from it ... but little else. Touchmaster's manufacturers are bringing out a range of software called Touchware, designed specifically for use with the graphic tablet; games and educational programs seem to form the bulk of the planned material, but the real proof of success will come if independent software houses decide to support it as well. Of course, the main stumbling block will be its price — nowadays, an independent hardware add-on has to justify its relatively high price to an awful lot of users before the market accepts it as standard.

The Touchmaster graphic tablet *does* provide users with the means to copy drawings and diagrams from paper to the Spectrum's screen, although the serious artist will probably be forced to re-load the picture under control of something like *Melbourne Draw* to make the final version worth close inspection.

As for replacing the keyboard with a Touchmaster ... well, the keyboards's not that great, but I still have my doubts. Until there's adequate software support, the use of the tablet would be restricted to the selection of on-screen options or simple games control ... and you'll still need the keyboard for data entry, and loading up *Multipaint* and the like. It's a nice thought to be going on with ... YS

DATASHEET

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PRODUCT
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MANUFACTURER
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PRICE
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SOFTWARE SUPPLIED
Multipaint

ADDITIONAL SOFTWARE AVAILABLE
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ROUTINE ERRORS

Error messages on the Speccy never seem to account fully for their sudden appearance. John Durst has come up with an interesting piece of code that'll use the error handling routine in ROM to give control to the user's program in the event of overflows, keying errors and the like.

Here come two ways of making the Spectrum 'error' routine do something more useful than simply drop back into the command mode, with appropriate message.

Before using either of them, it's as well to make sure that the program is not going to generate any real errors; that is, it should be properly de-bugged, so that any 'errors' are ones that can be dealt with by the program itself. This limits the possible errors mainly to Break effects — or perhaps, overflows, keying errors, undefined variables and the like. The reason for this is fairly obvious. If your program generates a really serious error, the appropriate message is the best possible response; that way you have a chance of doing something to stop it happening again. Any 'automatic' response is likely to push you deeper into the mire.

CHANGE OF ADDRESS

The easiest way of changing the error response is simply to alter the address in ERR __ SP and make it point — say — to the start of a routine (a menu, or something similar). This works pretty well with an all-machine-code program and I've used it to send any kind of Break back to the main menu — usually a Break during LOAD, or SAVE, or a pre-programmed Break key input. Unfortunately, it doesn't work at all well from a Basic program, tending to do nothing at all, or execute NEW.

A more elaborate system, which *will* work from a Basic program involves the old idea of making changes to the Interrupt mode. By altering the Interrupt mode from one to two, you can arrange for ERR __ NR to be scanned at each interrupt. If the routine finds anything other than FF (which means 'all clear'), it does a jump to a routine which sets up the data for a command — such as 'GO TO 10' in E __ LINE — and then executes it.

This seems virtually fire-proof, except that — occasionally — it's possible to overcrowd the editing space. The Spectrum gives a mighty burp (from indigestion?) and comes up with the message 'GO TO 10' (or whatever) in the lower screen. However, if you press Enter, it does what it's told, as good as gold.

The answer is very simple — 'GO TO 10' consists of nine bytes, as follows:

EC 31 30 0E 00 00 0A 00 00

EC is the token for 'GO TO'; 31 and 30 stand for '10' in ASCII; 0E indicates that a number follows; and the last five bytes hold the number ten, in integer form (0A).

ERROR OPERATIONS

The remainder of the routine carries out four operations; it restores ERR __ SP to the 'OK' condition, by making it FF; it clears the editing area by using the ROM routine SET __ MIN, at 16B0; it makes a nine byte space in the editing area by using another ROM routine, MAKE __ ROOM, at 1655; and finally, it loads the nine prepared bytes, which make up the command, into the editing area and then jumps back to the ROM at 12E2, to execute.

You'll also need to enter the two short routines — to alter the Interrupt mode and then to change it back again. Just for laughs (and for convenience) I've put them into two UDG positions, so you can call them with the commands, USR USR "M" and USR USR "N".

The 'Return to IM1' routine is needed if ever you want to be able to list your Basic program. But, of course, if you are very security conscious, you don't have to tell anyone what key entry will give you RANDOMIZE USR USR "N"! YS

NOTES	HEX	ASSEMBLER
Interrupt vector address	FEFF 82 FF00 FF	
Interrupt routine	FF82 F5 FF83 3A 3A 5C FF86 3C FF87 20 04 FF89 F1 FF8A C3 38 00 FF8D F1 FF8E 3E FF FF90 32 3A 5C FF93 CD B0 16 FF96 2A 59 5C FF99 01 09 00 FF9C CD 55 16 FF9F 2A 59 5C FFA2 11 AF FF FFA5 01 09 00 FFA8 EB FFA9 ED B0 FFAB FB FFAC C3 E2 12	PUSH AF LD A,(5C3A) INC A JR NZ,FF8D POP AF JP 0038 POP AF LD A,FF LD (5C3A),A CALL 16B0 LD HL,(5C59) LD BC,0009 CALL 1655 LD HL,(5C59) LD DE,FFAF LD BC,0009 EX DE,HL LDIR EI JP 12E2
DEFB: ("GO TO 10")	FFAF EC 31 30 0E 00 00 0A 00 00	
Set Interrupt "USR USR "M"	FFB8 3E FE FFBA ED 47 FFBC ED 5E FFBE C9	LD A,FE LD I,A IM2 RET
Restore Interrupts "USR USR "N"	FFC0 3E 3F FFC2 ED 47 FFC4 ED 56 FFC6 C9	LD A,3F LD I,A IM1 RET


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It all began with the ZX80 ...the first personal computer retailing for under £100. Next, Sinclair Research announced the ZX81, offering memory expansion to 16K. Completing the ZX series of micros came the Spectrum and its big brother, the Spectrum+.

Although the hardware has been modified extensively, not much thought has been given to ZX Basic ... and, compared to Basics on many other home computers, ZX Basic is sadly lacking!

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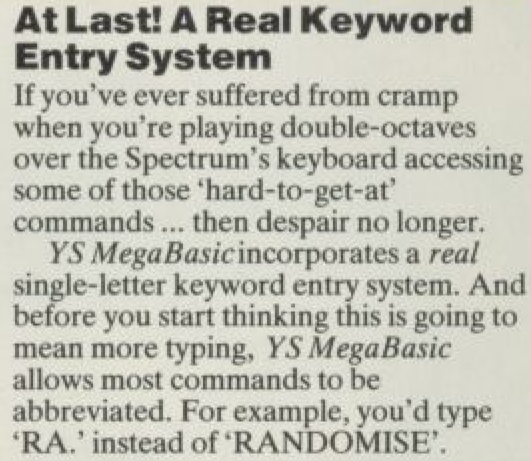
Incorporating many of the best features of Basics found on some of the Spectrum's major rivals (such as the BBC Micro, CBM 64 and Amstrad computers), *YS MegaBasic* gives you the opportunity to unleash power normally associated with machine code!

The program itself uses 19K of RAM, leaving you with 22K to write your own *YS MegaBasic* programs. It may seem as though you've lost a lot of memory, but you'll find you don't need so much code to create on-screen effects with *YS MegaBasic.* Anyway, when was the last time you wrote a program larger than 22K?

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The man behind *YS MegaBasic* — Mike Leaman.

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- *An extended command set.* ***YS MegaBasic*** *recognises over 35* ***new*** *commands, which allow you to access the new features available as well as providing the opportunity to make more of the commands in standard ZX Basic.*
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ZX BASIC?

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Here, *YS MegaBasic* is showing off its multifarious character sizes and fonts. Each window contains text in three different sizes: double height, normal height and that used for 64-columns; double height and standard text can be output in three different fonts.



The screen format for the input/output of *YS MegaBasic.* Three windows are provided for input, LISTing and RUNning programs; under software control, each window's size and purpose can be changed to suit individual requirements.

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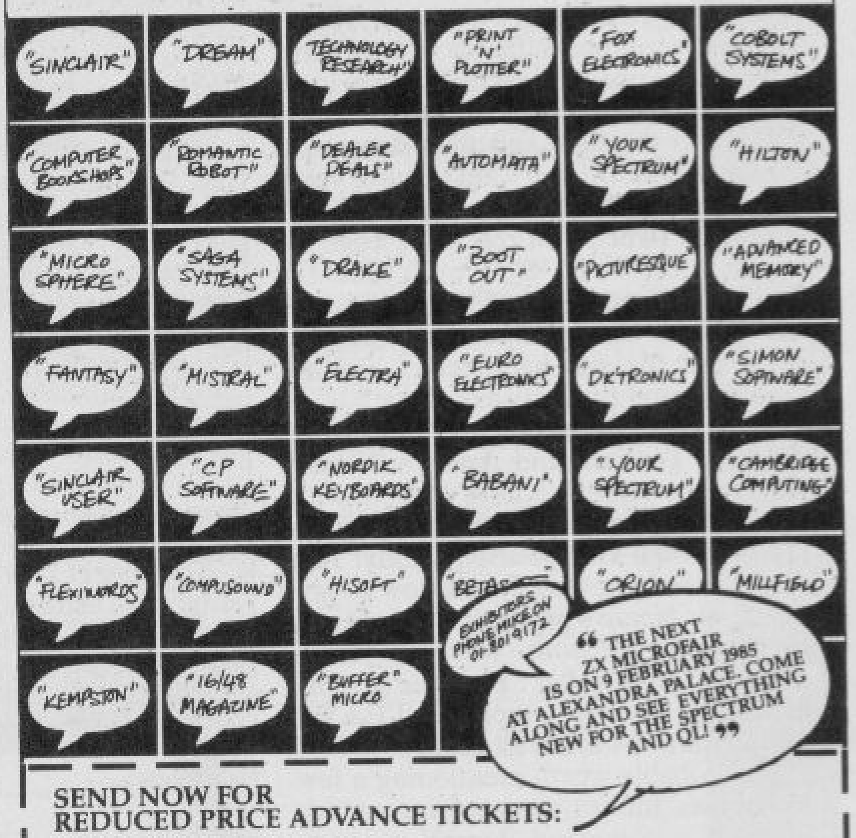
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Clive Gifford *dialled the* YS Adventure Helpline *and came up trumps with* Neil Mackintosh, Gary Smart *and* Peter Marment. *Reviewing credits go to ace hacker,* Dave Nicholls.

HAILING THE HELPLINE

Set to help *YS* readers with their adventuring problems, the helpline seems to be a resounding success. Samaritans, Neil Mackintosh and Gary Smart, have both been flooded with calls from near suicidal adventurers. So much so that **Peter Marment** has joined their ranks. Here are some of the biggest problems, along with Neil's and Gary's solutions ...

Most of the readers' calls were concerned with the old favourites like *The Hobbit* and *Colossal Adventure.* But there were a few newcomers, such as *Snowball* — with its nightingales and waldroids proving the major barriers to sanity. (By the way, if you're having trouble getting up the uni-slime ramp, go and nab the cat, drop it on the ramp and watch it clear the way for you by slurping up all the slime. Yuch!)

There were also some calls from adventurers stumped in *Planet Of Death, Knight's Quest* and *Velnor's Lair.* If any of you are trapped in the same locations, here's some tips. To pass the force field in *Planet of Death,* you must fire the laser *twice* into the field and then dance. In *Knight's Quest,* if you want to make your way through the 'almost impenetrable' forest, go (when you reach the edge of the lake) 'S', 'S', 'S', 'S', 'E', 'E', 'CLIMB TREE', 'S' and 'S'. Finally, to get through the Cave of Spores in *Velnor's Lair,* put the silk hankerchief around your face and progress as normal.

Other specific problems came from **Andrew Tennant** and **Andrew Nixon**. Mr Nixon seemed to have trouble with the shadow guarding the hole in *Golden Apple.* You'll kick yourself, Andy! Just turn off the lamp and the shadow disappears. Mr Nixon's problem is solved in a much more obvious way. If you're trapped in *Digital Fantasia*'s time machine ... try typing 'LEAVE MACHINE' — that's all there is to it!

It's probably worth mentioning a few techniques for problem-solving at this stage. If a command doesn't seem to work, check your surroundings for any signs of change and have a look at your inventory — mysterious things can happen in adventures, few of which are actually announced on-screen! Also, if an obvious command doesn't seem to work, try using one like it — not all adventures have the vocabulary you yourself have. Finally, as we've seen from Messrs Nixon and Tennant, the answers to most of the problems are staring you right in the face ... you've just got to engage brain and start revving!

To conclude, here's a few cryptic clues for all you buffs: *Colossal Adventure* — to get out of the flooding maze, it's initially easily done; *Snowball* — box clever to pass the waldroid; *Lords of Time* — to escape the blast, remember to 'leave' on time; and, of course, *The Hobbit* — waiting at the magic door has a familiar ring to it. YS

YS ADVENTURE HELPLINE
England and Wales: Gary Smart (0264) 59489 and Peter Marment (0264) 66660.
Scotland: Neil Mackintosh 041-332 2216.

'VENTURING OUT

VALKYRIE 17
Ram Jam Corporation/£9.99

Most adventures tell you somewhere near the beginning of the game itself exactly what you're expected to do — *Valkyrie 17,* of course, has to be the exception!

The box the game comes in reveals that you've discovered some answerphone messages (found on side two of the tape) that tell you that Valkyrie 17 is active again (?). Further discovery comes from wading through the dossier of plans, memos, etc, that accompany the tape; you find out that Valkyrie 17 is actually an experimental Nazi laser weapon from the Second World War.

OK, you're now ready to start the game and only your experience and cunning as a secret agent will get you through. As soon as you start playing, though, any thoughts of seriousness go straight out of the window — the game is *very* funny, especially its responses to most 'stupid' commands. Technically, the game's not particularly out of the ordinary, with simple verb/noun entry of most commands.

Valkyrie 17 has been written so as to give the player as much freedom as possible; so once you've overcome some initial problems you can go almost anywhere you like! This, to my mind, is the real charm of the game. All but one or two of the problems to be overcome are completely logical; on one occasion, the solution to one of them was *too* obvious for me to work out and I'm indebted to Trevor Toms of the Ram Jam Corporation for putting me out of my misery.

To finish up, *Valkyrie 17* is a very well thought out program, with very nice graphics and a wonderful sense of humour.

The price of £9.99 is on a par with other adventures and I think it easily justifies the cost. Highly recommended.

TIR NA NOG
Gargoyle Games/£9.95

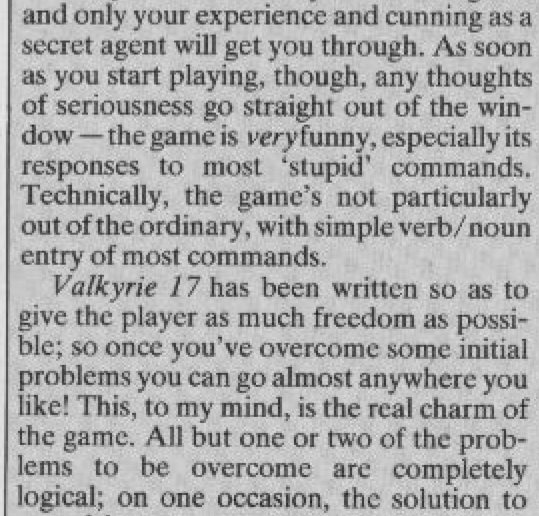
Gargoyle Games' first release was the very well received *Ad Astra,* a 3D 'shoot 'em up' space game. But *Tir Na Nog* could hardly be more different. It's an adventure that combines the 'what you see is what's there' graphic style of *Valhalla* with simple no-text keyboard controls. (That comparison is rather unfair though because the graphics in *Tir Na Nog* reflect all the advances in programming techniques that have occured since *Valhalla* appeared!)

The hero of the game Cuchulainn (Cucuc for short) is represented by a fully-animated graphic almost one third of the screen high. He scours the Land of Youth (Tir Na Nog) for the four pieces of the seal of Calum in an effort to re-unite them to defeat the great enemy.

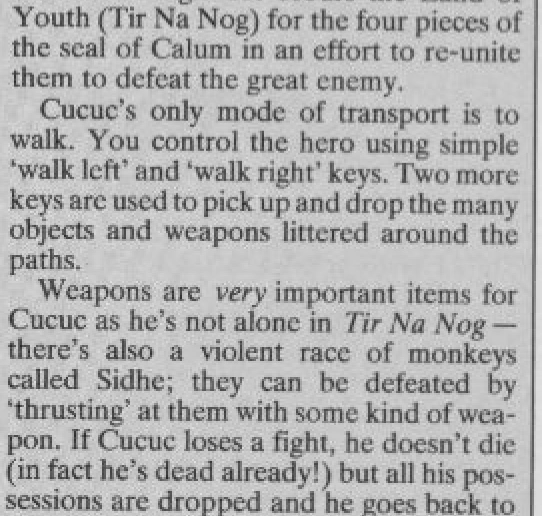
Cucuc's only mode of transport is to walk. You control the hero using simple 'walk left' and 'walk right' keys. Two more keys are used to pick up and drop the many objects and weapons littered around the paths.

Weapons are *very* important items for Cucuc as he's not alone in *Tir Na Nog* — there's also a violent race of monkeys called Sidhe; they can be defeated by 'thrusting' at them with some kind of weapon. If Cucuc loses a fight, he doesn't die (in fact he's dead already!) but all his possessions are dropped and he goes back to the starting position — so it's useful to save the game straight away when you start, if you don't want all the bits and pieces littered all over the shop!

Tir Na Nog is a mammoth undertaking which will take a very long time to complete and, as such, offers excellent value for money for 'mad mappers'. Add to that the superb graphics and you have a game which deserves to go down as a classic!



It's laughter all the way in this *James Bond* spoof package — as long as you know what you're meant to do, that is!



Here we see Cucoc about to make a monkey of himself! Great graphics go a long way to make this game a classic.

SPOT THE DIFFERENCE
COMPETITION

Here's a great competition to kick off the new year! Hewson Consultants and Saga Systems, in conjunction with *Your Spectrum*, are giving away £600 worth of software and hardware. Plus there's a quid off *Avalon* — see page 14!



This competition's ideal for all those of you who are always writing in to tell us when we've made a teensy-weensy error in the magazine (*Yah boo hiss! Ed.*). If you take a good look at the two cartoons below — based on Hewson Consultant's *Avalon* game — you may notice that they're not *quite* identical.

What we want you to do is ring each difference on the coupon cartoon and, once you've completed the rest of the form, write the number of differences you found on the back of the envelope and send it off to Avalon Competition, *Your Spectrum*, 14 Rathbone Place, London W1P 1DE.

FIRST UP!

Winner of this competition will be the first correct coupon to be plucked out of the Editor's hat at random — and if that's you, you're due to receive £90 worth of hardware from Saga Systems, including its Emporor 1 keyboard, and the complete range of software from Hewson Consultants. There'll also be 20 runners-up and each will receive a copy of *ZAP*— the machine code development system worth £20!



AVALON RULES OK!

- Entries for the Avalon Competition must be post-dated no later than February 28th 1985.
- Each entry form must have the number of differences between the two cartoons clearly written on the back of the envelope.
- The Editor's decision is final and no correspondence will be entered into regarding this decision.

I managed to find ...... differences between the two cartoons!

Name ....

Address ....

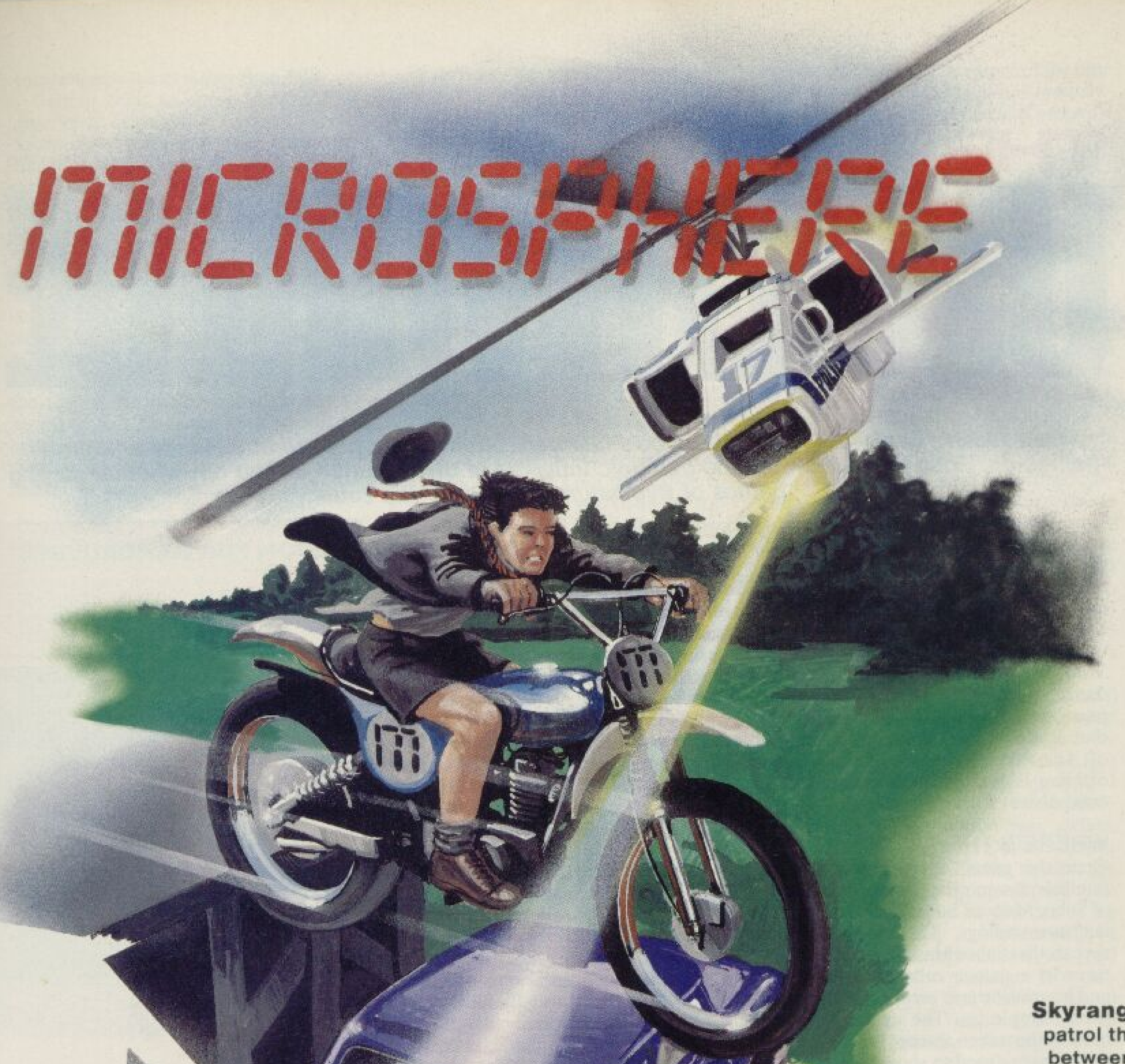
....

....

.... Postcode ....

Post off this coupon, complete with the cartoon you used to ring the differences, and send it to Avalon Competition, *Your Spectrum*, 14 Rathbone Place, London W1P 1DE. And don't forget to write the number of differences you found on the back of the envelope!

If you don't want to mutilate your precious copy of *Your Spectrum*, we'd be just as happy to see a photocopy of this coupon.



Skooldaze –
the game that has everything – excitement, drama, comedy, tragedy, catapults . . . join our hero on a madcap romp with your favourite characters – the wicked headmaster, the nutty professor, the ancient history master (the history's quite old, too!) and, not forgetting the swot and the school bully.
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72 Rosebery Road, London N10 2LA

THE ULTIMATE ADVENTURE — UNDERWURLDE

Sabre Man's back . . . and this time he's hell-bent on involving himself in all kinds of unholy goings-on.* Ross Holman *enters the demonic universe of* Underwurlde *to find out whether playing games of this nature is good for the soul!

Sabre Man is turning out to be Ultimate's answer to Indiana Jones — and in much the same way as his movie counterpart, Sabre Man looks set to be a standard character in many an Ultimate graphic adventure to come.

In *Underwurlde,* the sequel to *Sabre Wulf,* Sabre Man's in all sorts of untold danger in a labyrinth of rooms, caves and passageways. And if you're worrying that *Underwurlde*'s going to be a rip-off of *Atic Atac,* don't — Ultimate's latest offering is *totally* different and *totally* compulsive.

WHERE'S THE SABRE?

Once the game's started, you see the familiar, if somewhat diminished, figure of Sabre Man . . . but set in very unfamiliar surroundings. The cassette sleeve reveals that Sabre Man begins his adventures in a palace called Underwurlde, and his mission is to escape alive! Sounds pretty simple . . . The action takes up most of the screen, except for the top two lines that are used to show the score, the number of lives left, your 'gem power', the number of weapons collected, and how deep into Underwurlde you've penetrated.

Perhaps the most notable omission in *Underwurlde* is Sabre Man's trusty sword. In fact, our hero starts off without a weapon to his name . . . but there just happens to be a catapult lying on the floor of the first room and with it, an infinite number of stones. The other three weapons, a bow, a firebrand and a knife, lie further afield, but you can hold all four at once.

After Sabre Man's stood around for a while admiring the graphics, the 'nasties' will have come out of the woodwork to annoy him. Note that the larger sprites don't actually kill your character — they just annoy you to the point that you make some silly mistake. Of course, on the other hand, Sabre Man can be made to *kill* a few of the 'nasties' — a course of action I can thoroughly recommend.

GIVE 'IM ENOUGH ROPE . . .

After a while, I was wondering if Sabre Man could possibly die; in most Ultimate adventures I don't usually have time to think about this particular problem! Movement of your character left and right is possible — but since his jungle escapades, Sabre Man has acquired some gymnastic skills and he's now capable of jumping across vertical shafts. Ultimate has also programmed Sabre Man with a useful sense of self-preservation; every time he comes across a huge drop, he'll

ROOM FOR MANOEUVRES

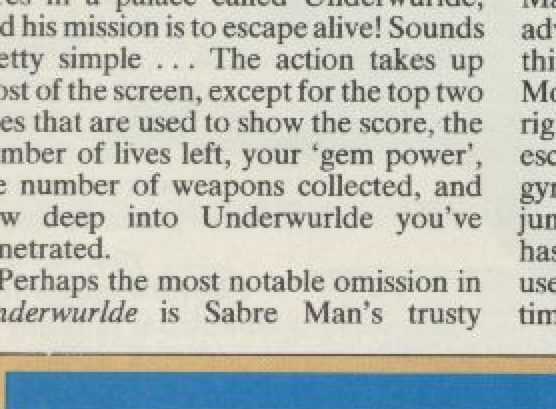
These winged terrors are an example of the kind of 'nasty' that infests Underwurlde. They won't actually **kill** you — they'll just get in your way and bounce you all over the shop until you make a fatal mistake.



When you press the 'Fire' key, a stream of weapons seems to career all over the screen. Here we see Sabre Man firing off a salvo of swords at the attacking birds of prey. Rotton shot, isn't he ...

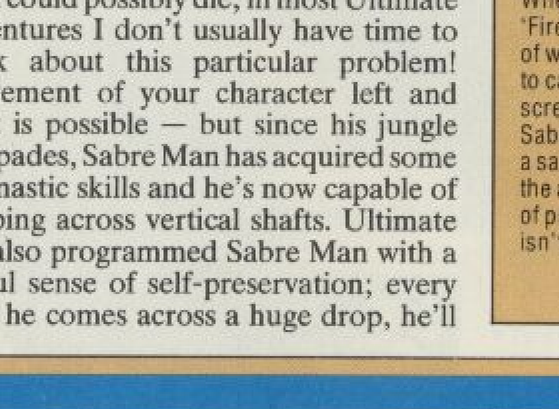
Ultimate has ma
at 3D perspectiv
rooms, but not b
in the lower leve
its room design
busy putting tog
Lore!

LOOKING FOR TROUBLE?



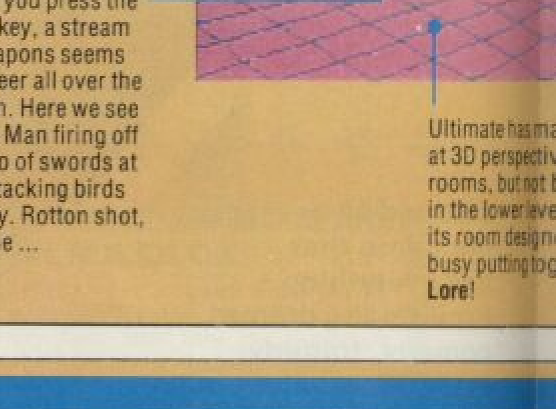
Here we go ... another adventure! I reckon the best bet is to go and grab that catapult, especially as I've heard it comes with an infinite number of rocks! I don't think much of the furniture in here — it's not half as colourful as **Sabre Wulf**! And I'm itching to know why Ultimate has programmed me to jump like the flea in Quicksilva's **Bugaboo** ...

A BIRD'S EYE VIEW ...



Uumm, what do I do now? Stuck on this dodgy-looking picture frame, it's only a matter of time before those pesky birds come looking for me. I've got the option of going up in the world — which'll take some fairly precise jumping around on the picture frames — or I could fall to a lower level. I know which is easier ...

FOR MY NEXT ROPE TRICK!

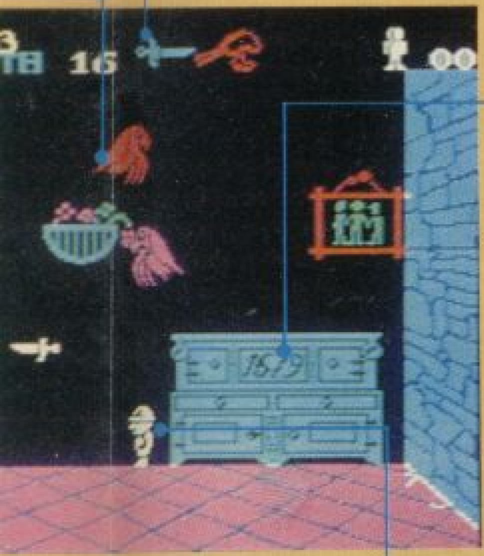


Just how do I manage to get in situations like this? I can either swing myself to the left to grab that gem or extend the rope downwards until I can jump safely to the ground. Of course, in the interests of computer science, I could always hang around and see which 'nasty' is going to knock me for six ...

automatically jump rather than fall.

Getting back to dying ... my first experience came when I tried to jump Sabre Man on to a nearby ledge. Of course, I misjudged it, and dropped through to the room below and ended up, legs in the air, stone-cold dead. And what do you know — everything looks different; underneath the castle, the caves are rock-strewn and you'll come across a number of bubbling craters. Having decided to jump across one of the craters, Sabre Man was found to float on the bubbles and head off to the room above. It seems a successful method of getting to the top of the maze, but most of my attempts were thwarted by a squid-like creature that seemed not to be sympathetic to the fact that I was pretty inexperienced at using the volcanic elevators.

Once you've collected a weapon, it's indicated here; in this case, the sword and the catapult have been found. Unfortunately, although Sabre Man can carry up to four weapons, he can only fire one at a time!



The Underwurlde palace is tastefully decorated with 17th Century furniture — but it's not just there to make the room look pretty! Sabre Man's going to be clambering all over the plants and paintings before this game's through ...

...mate has made an attempt ...D perspective in the upper ...ms, but not bothered at all ...he lower levels. Perhaps all ...room designers were too ...y putting together **Knight** ...e!

Here's our hero Sabre Man — fresh from his adventures in **Sabre Wulf**. He seems to have lost a bit of weight though ... perhaps he needs a byte or two to aat!

Discovering the ropes was also more of an accident than a planned operation. Approaching the edge of a precipice, I allowed Sabre Man to throw himself into the inky blackness and, to my surprise and Sabre Man's relief, the cave ceiling seemed to hold the graphic figure there as if it was smeared with superglue! Closer inspection revealed Sabre Man clinging to a rope, which could be extended by pulling back on the joystick until ... yes, you've guessed it, he gets nabbed by another of those tentacled terrors. By this time, you're feeling quite relieved that you're given six lives to complete the adventure!

Once you get the hang of the ropes, they're simplicity itself. As you've gathered from my first experience of using the ropes, though, that's not the problem — it's what you do once you're on the rope. It's essential to move downwards as swiftly as possible and *keep* firing; be prepared at any time to slow down or pause movement on the ropes, just in case of collisions. You also have to keep one eye out for stalactites — these can fall (at random, as far as I could see) when Sabre man jumps for the rope. Needless to say, stalactites are not the most user-friendly objects in Underwurlde.

Once you've lowered the rope to a level that you can jump off to the ground, you can always use it to climb up — you just have to remember where you left it. Of course, jumping off the rope once Sabre Man's reached the top is not the easiest of tasks but practise makes perfect.

After a few games I found that I could manoeuvre Sabre Man onto the bubbles in the rock pools, and this really was a much better technique for moving up to higher levels. In fact, I found it quite easy to jump from bubble to bubble to avoid the 'nasties', but I wouldn't advocate that technique until you've got a few hours of *Underwurlde* under your belt.

The only other thing about negotiating shafts that's probably worth knowing is that if you jump Sabre Man on to a gem, he'll build up the amount of energy that's indicated in the top left of the status panel. This figure is a measure of the time Sabre Man can spend falling *without* dying. So, collect those gems . . . it's worth it in the long run!

WHAT THE DEVIL?

Underwurlde is split into three regions and each is watched over by a guardian. These comprise of large purple graphics sitting under ominous stalactites. And you should by now have guessed the connection between the fact that you've to find three weapons (after the catapult) and three guardians to kill; each guardian requires a specific weapon to be fired at it before it'll cash in its chips.

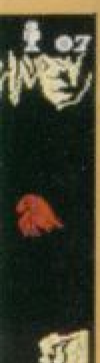
Once you've managed to kill a guardian, though, you'll be allowed through to the next section. Trouble is, you've also unleashed the eagles; these winged graphics will swoop down and carry Sabre Man off in their claws — sometimes they take you somewhere useful, but more often than not they don't. If an eagle does scoop you up and start flying off, you do have the ability to struggle which, even if it doesn't lead to you being dropped quickly, will certainly impede the eagle's flight.

Last, but certainly not least, you'll come across the third guardian which just happens to resemble the devil on the front of the cassette box. When I first came across this evil little graphic, I found I couldn't get past him at all — everything I fired at him was useless. Luckily, hairy hacker Dave Nicholls came to my rescue with the tip that the guardians could be jumped past. The trick is to get as close as you can to the guardian and wait ... eventually, a 'nasty' will come up behind you and knock you past the guardian. Not only does this mean you don't have to spend hours searching for weapons, but if you don't kill the guardian, the eagles don't appear — which certainly makes the game that much quicker!

JUMPING AHEAD

Once you've got the hang of manoeuvering Sable Man through some of the trickiest situations in *Underwurlde*, you're

...K!



...rab ...I ...ne ...)

UNDER ATTACK ...



Great! My first chance to kill a guardian and my catapult won't work. Hmm, I remember seeing a sword somewhere ... perhaps if I go and get that I'll be able to make some headway. Of course, I could always get real close to the goat, and hope that one of the 'nasties' will bounce me through. Well, it worked for Dave Nicholls...

UP, UP AND AWAY!



Now, I'm on the 23rd level — and there's nowhere to go but up! Luckily, there's two volcanic elevators and, as long as the 'nasties' stay away long enough, there's a chance this bubble could get me out of here. I can move about on the bubble, but if I get too near to the edge for some inexplicable reason I get the urge to jump off ...

WHERE EAGLES DARE



Having killed my first guardian, all I get for a reward is a flock of eagles on my tail. At least this variety of 'nasty' doesn't bounce you around the screen like a ping-pong ball — they just try and grab you! This one picked me up ages ago and I think it's going to drop me in its nest ... or not! Aaarghh!!



A prophecy is about to be fulfilled. The Dead will rise again to eat the flesh of the living...
Zombie Zombie
From the authors of ANT ATTACK, Sandy White and Angela.
DJR
Softsolid 3D* from SPACEMAN
*Patent pending
48K Spectrum £6.95
All titles available from
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HACKER'S GUIDE

After a routine check through* Underwurlde*'s code, hacker* Dave Nicholls *finds that it's not only the lead character you've seen before...

Those of you who, like me, have been playing around with micros for longer than you care to remember, will recall fondly the days when software protection meant breaking the little tab at the back of the cassette. Nowadays, of course, things are rather different ... although, strangely, Ultimate's games usually incorporate only the most rudimentary protection; in fact, its protection methods caused more trouble for the hacker than the pirate!

With the release of *Underwurlde*, this situation has changed — it's protected by an anti-MERGE device, a fast loading system and various other little tricks just to make life awkward. But the word 'impossible' never quite made it into the Hacker's Dictionary, and I soon found myself peering around inside *Underwurlde*'s code to see if there was anything interesting. Ultimate has never really encouraged innovative coding — its programmers have simply gone to the trouble of learning *exactly* what a Z80 is capable of and then written games using features that many other programmers miss.

Taking *Underwurlde* as a classic example of good programming, there are one or two techniques well worth adapting for use in your own programs.

COPY CATS!

To kick off, the code in *Underwurlde* is very well structured. The central loop of most Ultimate games consists of a series of calls to subroutines which is only exited at the end of the game; this means that each routine can be tested on its own. Of course, once you've written a good subroutine, there's no reason why it should be used just the once; scanning through *Underwurlde*'s routines, I noticed code from *Sabre Wulf* and others!

Secondly, Ultimate's programmers make great use of the 'JP (HL)' instruction; this is the machine code equivalent of the computed GO TO. To see the advantage of this, you have to realise that in most games there are many tasks the computer has to carry out, such as reading the keyboard and moving the sprites. But there are also a number of 'specialised' routines (to handle the obstacles in each room for example) that you can access via the indirect jump instruction. As each room type requires different corrections, there'll be a separate routine for each room type called by an indirect jump; this means that time won't be wasted 'looking' for objects that aren't there. Basic programmers may recognise this technique when constructing menu selections — instead of having a key pressed and a lot of IF ... GO TO statements, you could use an array of line numbers accessed by a simple 'GO TO line number'.

Finally, for the statistitians out there, the percentage scores are calculated from a maximum of 576 rooms, although I've been reliably informed there are 605 rooms altogether. The weapons can appear in any of four different combinations of rooms — so, once you've found one, if you know the trick, you know where the others are. *Underwurlde*'s code and data take up about 34K, with a further 3-4K being used as temporary storage when the game is running.

THIS IS YOUR LIFE

And now, the moment you've all been waiting for ... the POKEs. Well, grab yourself a blank tape and your original copy of *Underwurlde* and get ready. First off, type in the special header given, RUN it and SAVE it to the blank tape (following the instructions provided on-screen). Once done, re-wind the tape and clear your Spectrum using the command 'RANDOMISE USR 0'. Now type 'CLEAR 25000', press Enter, type 'LOAD""' and start up your tape. When the header's loaded, take out your tape and replace it with the *Underwurlde* master. Remove the lead from your cassette machine and listen to the tape, pausing it just after the program header (this is the short section that's heard first on the tape). Now re-connect the lead and start the tape up again. When the 'OK' message appears, pause the tape again and type in the following commands:

```
POKE 24791, 251:POKE
24792,207
RANDOMISE USR 24740
```

You should now get a garbage message on-screen — ignore it! Type 'NEW', press Enter and type in the following listing:

```
100 READ N
110 FOR X=62421 TO 62420+N
120 READ Y:POKE X,Y
130 NEXT X
140 RANDOMISE USR 62374
```

The final stage is to select one of the following data lines and add it to the above program. Each line does something different, but only one can be used at a time! For infinite lives:

```
150 DATA 11,62,0,50,240,231,
50,244,231,195,242,103
```

To say immortal after finding a gem:

```
150 DATA 11,62,0,50,153,148,
50,154,148,195,242,103
```

To make the weapons appear in the same places each game:

```
150 DATA 8,62,0,50,199,232,
195,242,103
```

All you have to do now is type 'RUN', press Enter and re-start the tape. Good luck, and thanks to Chris Wood without whose inspiration you would have been typing in about 500 bytes of machine code instead.

```
100 CLEAR 32000
110 FOR X=32768 TO 32796
120 READ A: POKE X,A
130 NEXT X
140 PRINT "START TAPE AND PRESS A KEY"
150 IF INKEY$="" THEN  GO TO 150
160 RANDOMIZE USR 32768
170 DATA 221,33,12,128,17,17,0,175,205,194
180 DATA 4,201,0,175,66,85,83,84,69,82,83,32
190 DATA 32,13,4,0,128,217,3
```

The special loader you'll need to use if you stand any chance of extending your time in *Underwurlde*.

THE ULTIMATE ADVENTURE-UNDERWURLDE

ready to start mapping out the rooms. This isn't that difficult as the screens are paged rather that scrolled. However, there are 605 rooms ... so the task is just a little daunting!

Perhaps the first and most important thing to master is control of Sabre Man. You'll have to be able to judge distances down to the last pixel if you're going to survive through to the end. Also, in a similar way to other Ultimate games, there's a slight delay between your entry to a room and the 'nasties' appearing — so, if you can move swiftly from screen to screen you can avoid many pointless confrontations. You also have to be careful not to rush blindly into one room from another — if you don't know the terrain that well, you'd be well advised to check out the next room carefully . . . just in case there's a huge drop as soon as you enter, so you can take the appropriate jumping action.

THE RETURN OF THE SEQUEL

Part of the appeal of *Underwurlde* must be the way the 'nasties' buffet you around from room to room like on a pinball machine ... without actually killing you. Although there are only three different breeds of 'nasty', all behave in a completely different way. On the whole, I'd advise you to eradicate them as soon as they appear — but then I walked around the whole game with my programmable joystick set to fire continuously.

Those who managed to defeat *Sabre Wulf*, this next bit's going to give you a feeling of *déjà vu*. Once you've battled your way through all three sections and manoeuvered our hero past the devil, all that's left to explore is a totally unexciting area that leads up to ground level and your final escape. And then you get the message of congratulations and news of the next adventures. Watch this space in a few months' time and maybe you'll be hearing all about *Pentagram* and *MireMare* ... who knows!

Personally, I think *Underwurdle*'s a wonderful game combining luck and skill with a very frustrating backdrop of humour and, of course, Ultimate's usual high standard of graphics. I for one can't wait for *Pentagram* ... or *MireMare* ... or whatever it's going to be called! YS



COMING SOON TO A SCREEN NEAR YOU

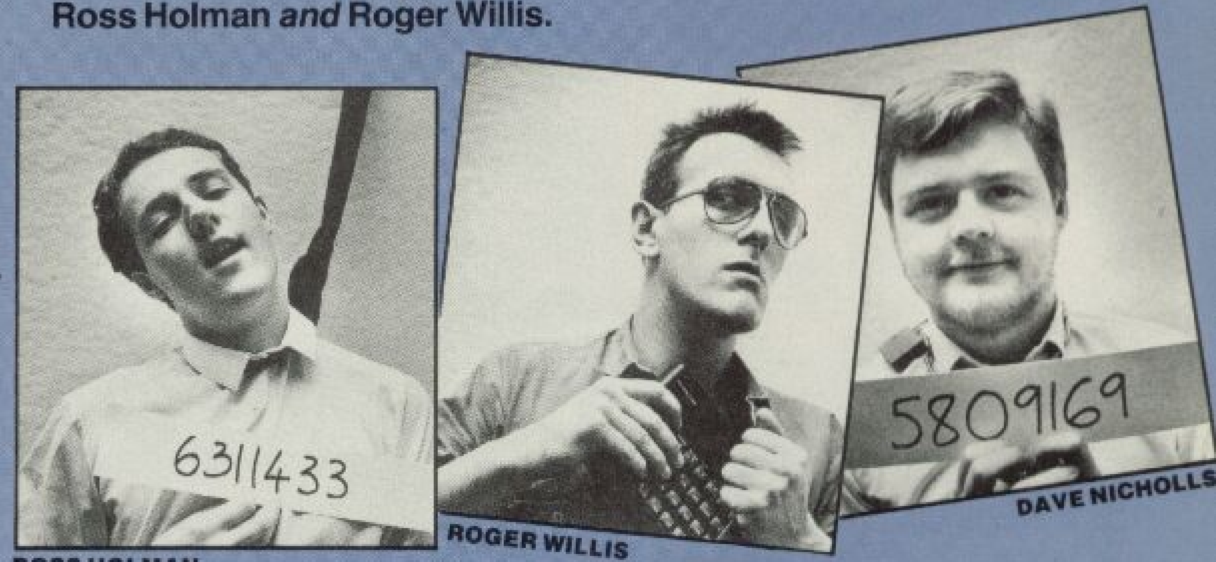
Next month, our cartoon critic will be hacking his way into Fantasy's *Backpackers*. Be there!

JOYSTICK JURY

***All the latest software from around the houses! Passing judgement this month are* Dave Nicholls, Ross Holman *and* Roger Willis.**

Our regular crew of software screwballs are in fine form this month. Draining the dregs of Christmas spirit are Dave Nicholls, the hairy hacker; *JSW* champion Ross Holman; and our own two-wheeled terror, Roger Willis.

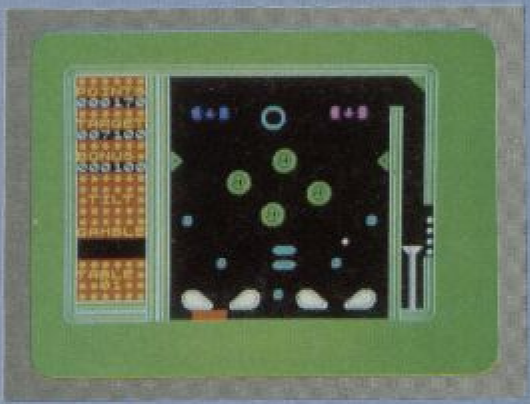
Just in case you find our scoring system too confusing, here's what it's all about. The score out of five at the end of each person's review is based on their own experience of the game. But that's pretty subjective ... so, they also use the HIT and MISS system to indicate its potential as a commercial success.



ROSS HOLMAN

ROGER WILLIS

DAVE NICHOLLS



FLIP FLAP

Software Supersavers/£2.99

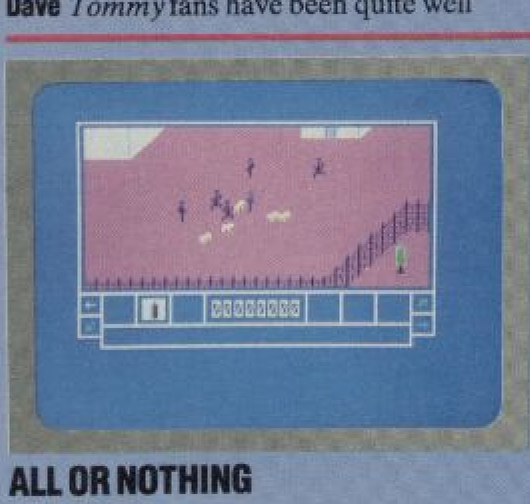
Dave *Tommy* fans have been quite well catered for on the Spectrum with at least two pinball games already available, including one marketed by Sinclair Research itself. This is probably why Software Projects chose to put *Flip Flap* in its Software Supersavers range of cheap software.

In fact, *Flip Flap* is just about the best all-round version that I've seen; if it had been released earlier, I reckon it would have sold quite well ... even at full price! The game includes all the features of the real thing, such as bumpers, traps, bonus scores and tilts and there's also moving targets to hit and a gamble option to give you extra points and balls. Add to this the fact that there are no less than 20 tables to play, each new table being offered after you've beaten the target score on the previous one, and you've quite a good game.

The only real minus in the game is that the ball does tend to behave a bit like a snooker ball with spin on it. It's only £2.99, so who's complaining anyway? *4/5* **HIT**

Ross Despite an appalling lack of instructions, a good game of pinball with different tables to give it interest. *3/5* **MISS**

Roger Being a bit of a pinball wizard, this one seemed right up my street ... and I wasn't disappointed either! *3/5* **HIT**



ALL OR NOTHING

Abbex/£6.95

Dave This is something of an oddity in that it doesn't really fit into any one particular category of game. It's basically an arcade game, but there's also some strategic and adventure aspects.

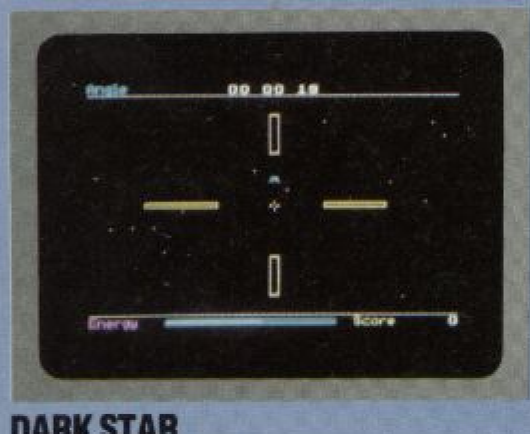
Visually it resembles *Ant Attack*, in that the enemy camp you've parachuted into is shown in isometric perspective which can be viewed from different sides — but there's far more to it than that! Your mission is to rescue the secret files hidden in the camp's warehouses but first, you must find the office safe containing a gun and the key to one of the warehouses. Each warehouse contains the key to the next one along with some other useful items like bullets and explosives.

All the time you're playing, the camp's being patrolled by guards who shoot at you, and dogs which just get in the way. Once you've found some money it's possible to bribe the guards to leave you alone for a while, but you can always tempt them to move away with a few carefully placed explosions.

All in all, this is quite a good game. I've a few reservations as to its lasting appeal, but I would recommend it. *3½/5* **HIT**

Ross Isometric full-colour graphics aren't such a thrill these days, but they are used well. *1/5* **MISS**

Roger Get ready for this death-defying program — it's quick wits all the way. *4/5* **HIT**



DARK STAR

Design Design/£7.50

Dave Design Design has taken vector graphics to a stage where the speed of the game is limited by players' ability rather than hardware restrictions.

The game itself is basically a derivative of the *Star Wars* arcade game, with the trench section missing. Your task is to rid the universe of nasties by flying your spacecraft, called the Liar, through the galaxy and down on to occupied planets where you have to destroy the enemy bases; these consist of defensive rings of towers that must be shot or dodged.

Planets can have more than one base; in fact, some planets also have spaceports and energy dumps on them. Spaceports don't have to be destroyed, but the energy dumps replenish your energy supplies and become vital after a while as there are 256 sectors to clear!

Dark Star has a very versatile menu system allowing the game to be customised; for example, the speed and accuracy of the alien weapons (as well as the keys used to control the Liar) can all be changed to suit your own requirements. Unfortunately, after the novelty of the blindingly fast graphics has worn off, the game becomes rather repetitive and loses most of its appeal. Hopefully Design Design's next offering will be a *game* instead of a programming exercise. *3/5* **HIT**

Ross An incredibly fast *Star Trek* variant, with the emphasis on arcade action. Setting the game controls to 'devastating' and turning off all the alien's missiles makes the game much more fun! *3/5* **MISS**

Roger Graphically clever stuff for the naturally trigger-happy. Apprentice gamesters will be able to hone their reaction times to perfection. *2/5* **HIT**

JOYSTICK JURY



CHINESE JUGGLER

Ocean/£6.90

Roger To be honest, my lack of infatuation with this oriental variety act is probably connected to personal taste. Legendary inscrutability, or objectivity, or something, must be maintained however.

Players are required to rush around with plates of various colours. The purpose is not to serve up two 19s, a 43 and a 27 with extra sweet-and-sour sauce, though. It's all about spinning 'em on top of sticks and keeping one's past successes going whilst doing it.

Other juggling tricks can be performed so as to change the colour of plates and increase score. Success with all eight plates spinning apparently leads to more difficult screens and less valuable dishes of a darker hue can be dumped off the back of the stage...

With all the ingredients of success, *Chinese Juggler* doesn't really make it, however you look at it. It requires skill and tactical planning, sure enough — but I found the fear, panic and aggression of good arcadia to be missing. It doesn't even possess the saving grace of being weird. *2/5* **MISS**

Dave This is one of those games that seem great when you first start playing them, but don't hold you at the screen. *1/5* **MISS**

Ross A fairly inscrutable game that seemed to have a lot to do with smashing plates! The point of it all? Don't ask me ask Confucious! *2/5* **MISS**



DANGER MOUSE IN DOUBLE TROUBLE

Creative Sparks/£6.95

Dave Baron Greenback is at it again — not satisfied with his conquest of TV, he's decided to take over the VDU as well! Luckily, Danger Mouse and his trusty sidekick Penfold have got wind of his plan and have leapt into action...

Your first objective is to fly Danger Mouse's aerocar from his hideout in Mayfair to the Baron's lair in the jungle. Aah, but the Baron knows they're coming and he's sent a fleet of flying robots to stop them. These robots can be repelled by a blast from DM's jukebox, but a different song is needed for each type of robot; on lower levels the selection is automatic, but later on the player must decide which song to use. Once in the jungle, DM and Penfold proceed on foot, jumping over crocodiles and scaring off pumas, until they reach the Baron's HQ. The final battle involves DM turning off a number of yellow lights on a grid; if he fails, an android Danger Mouse is released on an unsuspecting world and the game is over.

Throughout the game the graphics are superb and there are lots of nice touches that mark this as a very well thought out game.

Danger Mouse In Double Trouble will probably appeal more to the younger player as it's slightly too easy for the hardened arcade freak, but the graphics are good enough for anybody. *4/5* **HIT**

Ross The automatic self-play facility that cuts in if you're not doing too well saves all the tedious business of actually pressing keys yourself. I thought it lacked variety. *3/5* **MISS**

Roger 'Oh Heck' cries the on-screen Penfold, as DM gets it wrong again. Creative Sparks hasn't got anything wrong ... *4/5* **HIT**



KUNG FU

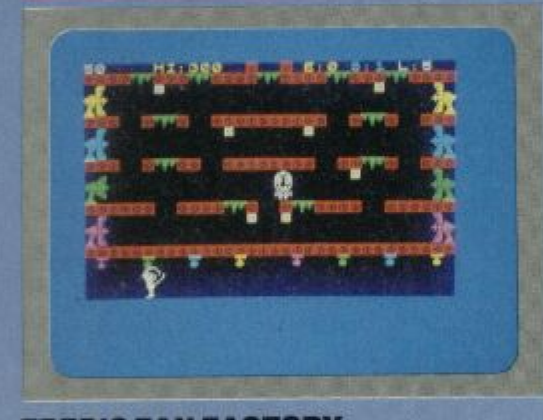
Bug-Byte/£6.95

Roger Charmingly oriental graphics frame well-animated Bruce Lee clones trying to knock each other senseless in this superb example of on-Spectrum violence. Stomping, rather than getting stomped, means advance as well as retreat, and there's a choice of four classic blows in the authentic 'punch-chop-kick' martial arts tradition. Your inscrutable opponent will attempt to block all your attacks and smack you in the gob. An action replay facility allows you to study the sequence leading to each terminally-successful knuckle sandwich delivery.

Acquisition of 48K black belt status eventually leads to another screen with different background and figures — but the action stays more or less the same. This is one of few action games where cursor control can be extremely accurate, simply because of Kung Fu fighting's formalised movements. Although it initially appears simplistic, the various combinations of attack, defence and surprise can be very entertaining and it's certainly safer than the real thing! For enthusiasts of the real thing, it'll provide a chance to keep in trim while their smashed bodies heal ... *3/5* **HIT**

Dave *Kung Fu* is quite a good martial arts simulation, but I'd have liked a few more possible 'moves' and a bit less randomness. *2½/5* **MISS**

Ross A delightful program combining humour, skill, good graphics and violence. The thrill of advancing on your opponent and knocking him down with one swift blow is fun. *3½/5* **HIT**



FRED'S FAN FACTORY

Software Supersavers/£2.99

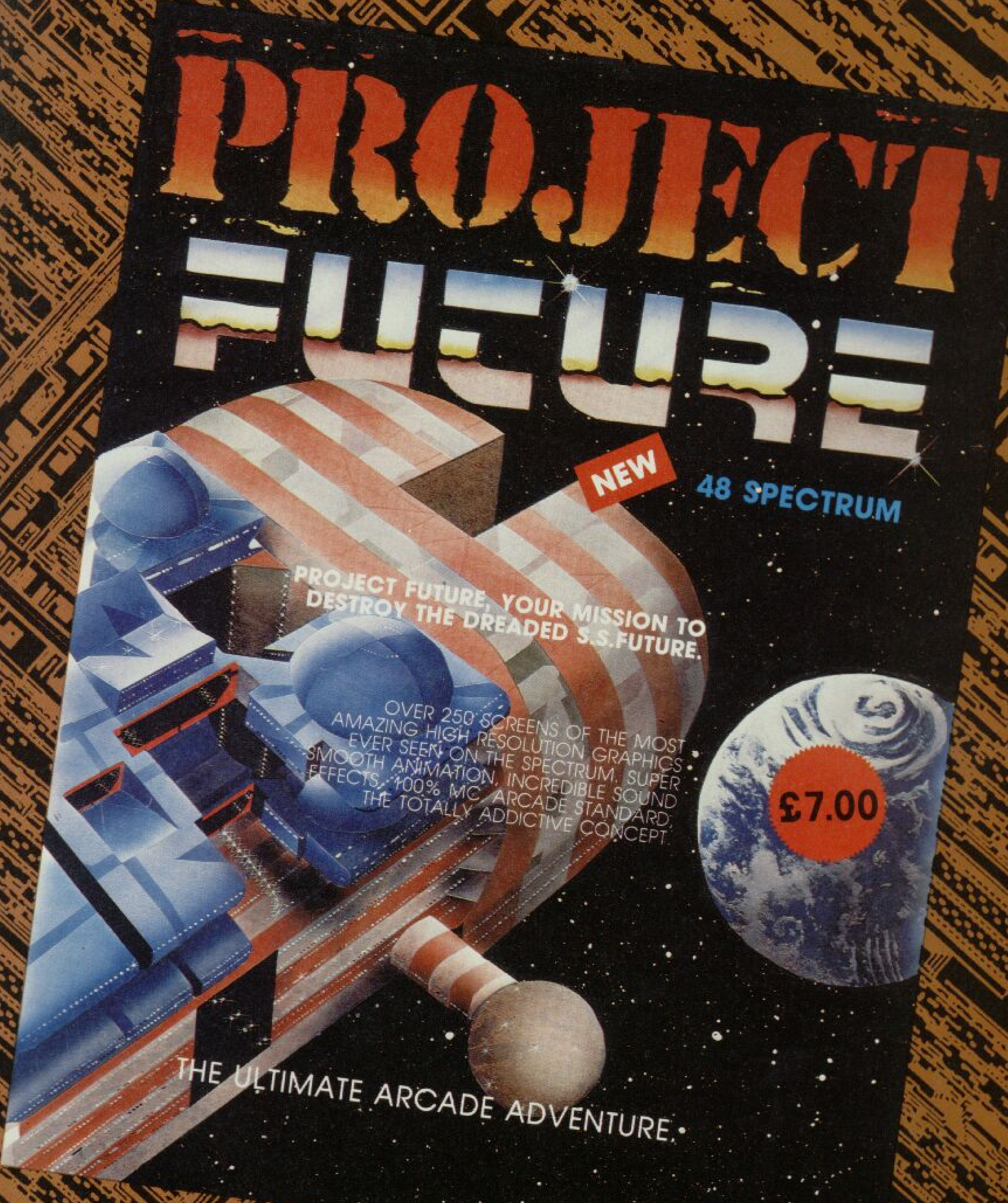
Roger If ever there was an argument in favour of computer-controlled robots replacing human wage slavery in factories, this appalling excuse for a 'game' is it ... So mindless is Fred's daily toil that management — which is anybody foolish enough to have bought the program — only demands that he dutifully shuffles from left to right, switching fans on and off.

The surplus value from his labour is created by blowing 'balloon men' along the various factory floors, knocking off point-scoring objects and rising inexorably towards an exit at the top of a single screen. Cheap it may be, but graphics are crude and keyboard control annoyingly imprecise. Each game-cycle, timed in numbers of available 'balloon men' and their related 'lives', is pathetically short. Given 48K of potentially creative programming space, the whole thing's nothing short of an insult!

Unfortunately, Fred showed absolutely no signs of understanding his concrete working class conditions or historical role — he failed to go out on strike. So I pulled the plug and made him redundant instead. Machine code like this could easily change someone's hobby from computing to knitting! *0/5* **MISS**

Dave It might have been more fun if the instructions had explained what I was meant to be trying to do ... but I doubt it! *0/5* **MISS**

Ross When I first caught a glimpse of this game, I thought the idea of it was quite novel ... but after a few goes I realised that, unfortunately, it's dull, dull, dull! Moving around on-screen proves most frustrating. *1/5* **MISS**


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JOYSTICK JURY



EDDIE KIDD JUMP CHALLENGE
Martech/£6.95

Roger Yes, I can tell you from personal experience that leaning back or forward can certainly affect your stability whilst jumping a motorcycle. I can also tell you that, just as in this program, getting it wrong has spectacular consequences. Here, though, Eddie always gets up and waves to the crowd — I usually stay down, screaming with pain ...

Approach distance appears irrelevant, so long as the bike has climbed through its five gears and indicated speed is at its maximum when taking off from the ramp. All you really have to do is control the bike in the air and that, presumably, governs the number of cars successfully jumped. Sounds fine, doesn't it? Well, it isn't ...

Cheapskate graphics only serve to underline the fact that Eddie Kidd has attached his name to a fairly primitive arcade game that gets boring quicker than players will get good at it. The intro — or practice — screen demands you jump a pushbike over oildrums; trouble is, you make a perfect jump every time! Oh yes, jumps beyond a certain limit produce an offer to SAVE on to blank cassette for competition entry purposes, but I can't imagine anyone bothering. *1/5* **MISS**

Dave The BMX section gets annoying — it's so easy you can do it with your eyes closed! Jumping with cars is much more difficult and quite addictive. *4/5* **HIT**

Ross You can control Eddie quite well, but even after practise I found it diffficult to make any successful jumps over a decent distance. The 'gusting wind' didn't help either! *2/5* **MISS**



ZOMBIE ZOMBIE
Quicksilva/£6.95

Dave Oh no! Antescher has been invaded by zombies — nasty green ones that turn red with rage and attack whenever you get too close.

To help you rid the city of this influx of *Duran Duran* fans, you're equipped with a helicopter which you can use to fly around in safety. But you have to leave it when you're destroying the zombies — a feat accomplished by running into them from behind! Once hit they turn all slavelike and can be led up onto any convenient wall where they will happily jump to their death to the tune of *Ten Green Bottles.* If you're not too confident of controlling the zombies this way, you can always fire your 'puffer' at them which'll make them run away to a safe distance.

Any architects out there will also be glad to hear that your helicopter is capable of carrying a large number of bricks around, so the city can be re-defined to suit yourself; you can also have some fun with your own brand of 'Soft Solid graffiti'!

Basically this is *Ant Attack* all over again and as such it will appeal to Ant Attackers everywhere — but if you found *Ant Attack* a tedious experience then don't bother with *Zombie Zombie.* For those of you who've seen neither *Zombie Zombie* is probably the best of the two. *2½/5* **HIT**

Ross This is just too similar to *Ant Attack* to offer anything very exciting. The tunes are OK and the ability to write obscenities on the bricks should keep you amused. *1/5* **MISS**

Roger Tidying up the undead can be amusing, even though I'm told it's a pastime short on originality. Probably a hit. *3/5* **HIT**



NOAH
Esp Software/T.B.A.

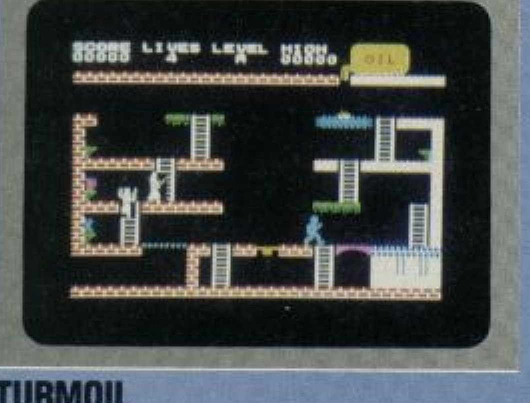
Ross Deciding the fate of the whole animal Kingdom is no easy task ... but as Noah, that's your lot! You've just three days to collect all 31 pairs of animals and return them to the Ark. And there are 256 screens to explore, so hunting down all the animals is a fairly daunting task!

Noah is played by a large five-by-three graphic; the cursor movement makes everything look a bit jerky, but it's perfectly adequate for a game of this type. On each screen are a number of fixed graphics (such as grass, water, fences or huts) all of which you have to manoeuvre around; the impending flood has understandably made Noah rather nervous of water! There's also a lump of food which must be eaten before you can move on to the next screen. Watch out for the lamp and key, as you'll need these to explore the caves and the area behind the Great Wall. And if you get lost, you can access a map of the whole playing area with your position marked on it.

The game features some very nice large graphics of animals, but overall I found the whole thing just a bit too repetitive and slow. *2/5* **MISS**

Dave I wish software houses would test their programs properly; in this one, the Kempston routine is back to front so that to go left you push right and *vice versa.* Not bad for keyboard players though ... *2/5* **MISS**

Roger It's so slow that even the most devout games disciples will be praying for a miracle to speed things up! *1/5* **MISS**



TURMOIL
Bug-Byte/£6.95

Ross Picture a garage, our man with a spanner Mick the Mechanic, and a plague of marauding Arabs — and you've got *Turmoil!* The idea of the game is to guide Mick up and down ladders and along platforms to fill his oil can with the precious black stuff. Now manoeuvre Mick over a grid in the floor and drop the oil; this makes a car appear on the conveyor belt. If you manage to complete this feat a second time, you get to move on to the next screen to build another motor.

Turmoil stands out from other 'ladder and levels' games currently flooding the market because it makes use of 'spring' power. Mick himself has no natural jumping ability, so to get him leaping on to the necessary platforms, you have to guide him over a spring ... he'll then be thrust up in the air in proportion to the 'springyness' of the spring. The Arabs, who seem to be *very* intelligent, also use the springs and ladders in their efforts to thwart your plans. You can kill an Arab by spilling some oil in his path, but they're soon replaced so it hardly seems worth it!

Well, it may be just another 'platform' clone, but it's suitably different to be successful — I liked it. *3½/5* **HIT**

Dave A nice change from the usual selection of platform games. The springs are a great idea and the bouncing Arabs are enough to give you a case of the Sheikhs! *3/5* **HIT**

Roger It's a tried and tested formula ... with a few dirty tricks thrown in. *4/5* **HIT**

EXPLORING THE SENSE OF SOUND!

3 Channel Sound Synthesizer



Any microcomputer is capable of manufacturing sound, however in order to produce a single octave 'C' note with a frequency of 8372 Hz the signal needs attention over 16,000 times per second.

To produce software capable of performing just this one task would be difficult if not impossible, especially when you consider that to produce arcade type sound effects require even greater attention.

The production of these sounds effects without the constant attention of the processor is now possible thanks to the AY Sound Chip, its flexibility makes it essential for a wide range of applications including music synthesis and sound effects generation, continuing the monitoring and production of sound after the initial command.

More often than not realistic sounds require more than one effect and this function is provided by 3 independently controlled channels, as an example, compare the sound produced by the single note of C, with that produced by the chord 'C' and you will know just what I mean, likewise producing the sound of an explosion using all 3 channels gives games a totally new dimension.

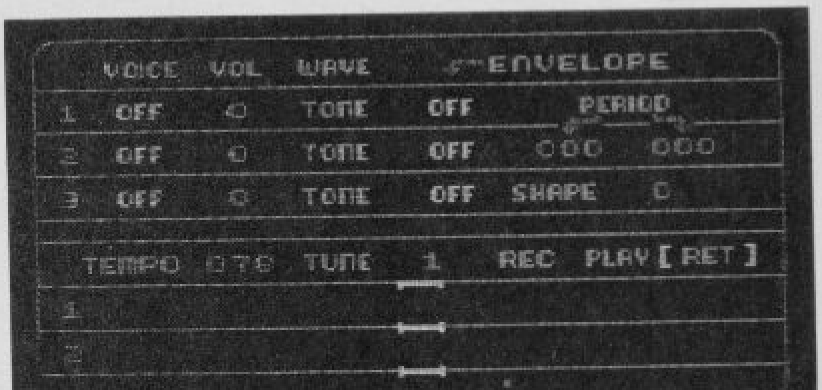
Add to this the ability to alter the pitch tone and shape of the sound you have produced and it's flexibility is unlimited. In simple terms, imagine the note you have produced as a calm sea, by altering the pitch and shape you can produce waves, the top of the wave corresponds with the maximum volume and pitch of the note, which like the wave itself rises and falls.

Free Music Designer Cassette Worth £9.95

Beethoven to Bowie – Starwars to Splats.

The screen display shows all functions. Simply move the cursor along the keyboard, select the desired note by pressing the fire button and the note selected then appears on the screen.

You can vary the tempo/volume and when 'played' the notes simultaneously scroll across the screen. 10 Envelope controls mean that once created, tunes and sounds can be subtley altered given varying attack and decay times to create futuristic music and sound effects. You can record and save up to three different tunes and amend each one as necessary. The dk'tronics Sound Synthesizer is suitable for both Spectrum and Spectrum + models and is guaranteed to give you hours of fun and would make an ideal Christmas gift, you never know you might turn to be another Stevie Wonder.



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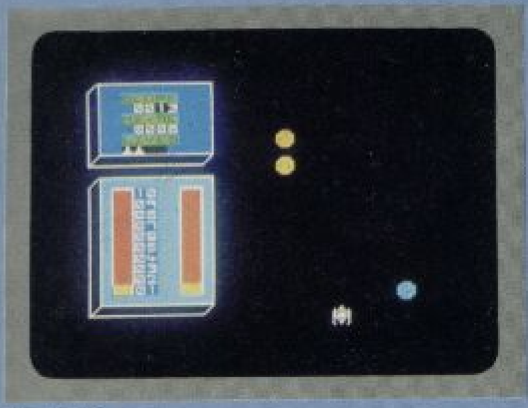
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JOYSTICK JURY



FREEX

Software Supersavers/£2.99

Ross *Freex* is an *Invaders/Galaxians* clone with some 60 different stages. The display's split into two parts with a status panel (showing the score, lives left, and position in the game) on the left, and the playing area on the right. You control a gun ship which sits at the bottom of the screen with controls to move it left, right, up or down and, of course, fire. The ship will only go about half-way up the screen, but this is good enough to escape from most tricky situations.

The aliens usually descend in groups of three or four and exhibit some very bizarre behaviour; some are easy to kill and some are not. After ten waves of attack, you move on to the next phase and get a credit life; here you face a whole new batch of aliens ... and this lot shoot back!

On loading, you can choose to see a demonstration game; what you're not told, however, is that the demo takes about 50 minutes in all!

It's good to see a company like Software Supersavers supporting not brilliant, but reasonable, pieces of software. Hopefully, it'll encourage the authors to produce better games. *2/5* **MISS**

Dave Not another *Space Invaders* clone!! Still, it's a cheap and cheerful variation on a theme — a Scrooge special, maybe? *1½/5* **MISS**

Roger A throw-back to the happily forgotten days of computing coconut shies. *0/5* **MISS**



SIR LANCELOT

Melbourne House/£5.95

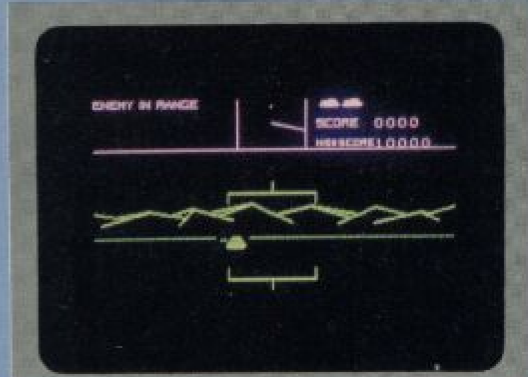
Ross This is a simplified *Manic Miner*-type game that packs an incredible 24 screens into a 16K Spectrum. The idea behind the game is fairly unoriginal — collect the flashing objects on each screen to make an exit appear that's used to get on to the next level — but the actual implementation is quite cute. Your little Lancelot figure runs around at a fairly hectic pace, and all the spare Lancelots march in unison to and fro across the bottom of the screen. (Ring any bells yet?)

The aim of the game is to progress through all the rooms of the castle in search of the Holy Grail. A menagerie of animals patrol the various key points, although memory does rather restrict their number. Lancelot jumps gaps, moves left or right (even when falling) and has no problem surviving even the longest of falls.

The graphics appear to move in four-pixel stages, which means that it's slightly less precise than I would have liked — but the obstacles and objects have been carefully placed to pose maximum problems. *3/5* **HIT**

Dave *Lancelot* is one of the best platform games I've seen for Miner Willy starved 16K owners. Melbourne House has done well to fit it all in, but the sprites leave a lot to be desired. *3/5* **HIT**

Roger Hunting the Holy Grail is good, if simplistic, sport. But it's difficult to cope with a fevered imagination like mine in just 16K! *3/5* **HIT**



BATTLEZONE

Quicksilva/£6.95

Ross This is the Atari approved version and as such, is a very competent copy of the original. Quicksilva must be on its knees praying there's still someone left who's waited for the 'official' *Battlezone,* but after all the copies there've been, there can't be many!

The game itself contains all the features you'd expect, including some *very* clever missiles. You get to control a tank, trundling across a flat plain that's occasionally littered with large cubes and pyramids. A radar at the top of the screen shows the position of approaching enemy vehicles, and messages pop up on the left to let you know when an enemy is in range (although they'll probably send you an explosive reminder!).

The controls take a little getting used to; they stimulate the two-level controls as used by the arcade game, rather than the standard joystick layout. The line drawing of the graphics is, as Quicksilva claims, fast — and this is probably the best version I've played on the Spectrum. Honest! *3/5* **MISS**

Dave Well, if you haven't already got a copy of this game, this is the one to get. Not only is it the 'official' Atari version ... but it's as good as any I've seen! *2½/5* **MISS**

Roger Quite a reasonable training aid for both Panzer crews and London's taxi drivers. Definitely a hit. *3/5* **HIT**



JASPER

Micromega/£6.95

Roger Forget the nonsensical storyline — "mummy rat warning young Jasper about how dangerous the jungle becomes after the 'Furt is Wangled'" — because this superb offering is obviously intended as a covert training aid to Central American guerrillas. Twenty-two screens of lethal shrubbery, wildlife and obstacles have to be negotiated successfully, to recover the key and get safely back indoors ... to continue one's studies of Che Guevara's Collected Works in Basic, no doubt!

Everything kills with gory certainty, but a smart rat can collect all sorts of useful tackle along the way. Pacifists will relish Jasper's inability to slaughter vindictive rabbits, spiders, wasps, dogs, bears, scorpions, frogs and monkeys (not to mention the odd 'Contra' chucking spears and the sinister helicopter buzzing through some frames, blasting away at our Jasp). Avoidance and survival skills are the name of *this* game.

Assault course simulation is a strong feature, with ropes *in situ* to swing on and others lying about in handy coils for later use. Picking flowers helps jumping ability, food can be picked up for score and sustenance, umbrellas stored for cliff descent and the occasional aerosol spray used for dodgy weed disposal. Acquisition of Magic Potion restores lives, too. If you can handle attractive cartoon graphics, excellent arcade tactics and essential adventure strategy, then an awful lot of practice with Jasper could get you a decent job as a full-time guerrilla. *5/5* **HIT**

Dave *Jasper* has a lot of very pretty graphics, but technically the game's a bit naff. Swinging on the ropes makes the tune slow down and the attribute problems are awful. *1/5* **MISS**

Ross Another 'jumping/platform' games where you utilise various objects to aid your progress. Jasper's ability to crawl, use ropes and perform extra long jumps adds to the thrill, but not enough to keep *me* interested. *2½/5* **MISS**

EVERY PICTURE TELLS A STORY

Anyone can be an artist on the Spectrum — it's just a matter of co-ordination. Let Chris Somerville tell you where to draw the line.

Everyone must remember using a pantograph at one time or another ... but for those who don't, it's a mechanical instrument used to translate a copy of a drawing to any scale. It may be cheating to use a pantograph but if, like me, you don't have the artistic flair of Rembrandt then it's a worthwhile principle to keep in mind.

ALTERNATIVE ART

Now there are many excellent programs that allow you to create screen graphics by manipulating the cursor on-screen. Unfortunately, not everyone's endowed with the necessary artistic talent that's needed to draw directly to the screen — whether you're using a keyboard, joystick or light pen to control the cursor.

There's another method of transferring an original drawing to the screen, and that's to trace the picture on to a piece of transparent plastic material and tape it on the screen as a drawing guide. Trouble is, the original drawing can't be bigger than your TV screen, and the distortion caused by the thickness of the screen precludes accurate work.

There are, of course, mechanical/electronic graph pads and digi-tracers, ranging in price from £50 to over £100. These, however, cannot cope with large sized drawings; certainly, a pop poster or large scale map would be way beyond them.

SQUARING UP

The program included in this article allows you to transfer any drawing — a map, a book illustration, or whatever — in scaled outline, *regardless* of size. The only restriction on size is that the graphic you wish to enter must lie in the same proportions as the computer screen; this means that any picture, or part of the same, that you intend transferring must be roughly in the proportions three units wide to two units high.

Having chosen your subject, you now need to overlay it with a grid of squares; on something like a map these are already there — providing the necessary grid references. In most cases, though, you'll need to draw a pattern of squares in pencil over the original illustration. A more flexible system, and one that'll save your drawings from being covered with squares, is to draw the grid on an acetate sheet (obtained from any good stationer or art shop — just ask for a few pieces of overhead projector film). This can then be placed over the drawing; you should use a fine line marker pen to square up the acetate sheet — I'd suggest the Staedtler Lumocolour 313 Permanent.

The grid should be numbered from the bottom left-hand corner, both vertically (Y-axis) and horizontally (X-axis). Normally, it's best to number the co-ordinates of the bottom left-hand corner as X=0, Y=0 (or simply 0,0); if you have a grid numbered in some other fashion — a map for example — or if you're using only a portion of a larger grid, it doesn't matter as the program adjusts the co-ordinates and scales the square to match the screen.

YOU GET THE PICTURE

Once you've run the program you'll be asked whether you require a printout of the final plot and draw positions of your creation; you may need these for inclusion in another program. (It's worth noting that these are not the co-ordinates as you enter them, but rather their posi-

SPECTRUM PANTOGRAPH

Once you've typed in the listing and RUN it, have a look through the menu options available with the package; the various options are tabulated on the last page of this article.

```
   5 CLEAR 30548
  10 RESTORE : FOR I=USR "A" TO
USR "A"+11: READ A: POKE I,A: NE
XT I
  20 DATA 17,0,72,33,86,119,1,0,
8,237,176,201
```

Lines 5-20 Clear memory for the program and POKE the data required for the user-defined graphic.

```
  25 GO SUB 8000
  30 LET code=USR "a"
  50 GO TO 100
```

Lines 25-50 Set the variable 'code' and jump to the 'start' routine.

```
  60 POKE code+1,0: POKE code+2,
72: POKE code+4,86: POKE code+5,
119: RANDOMIZE USR code: RETURN
: REM reprint
  70 POKE code+1,86: POKE code+2
,119: POKE code+4,0: POKE code+5
,72: RANDOMIZE USR code: RETURN
: REM copy middle block
  80 IF PRINT=1 THEN  LPRINT "PL
OT ";X;",";Y
  85 RETURN
  90 IF PRINT=1 THEN  LPRINT "DR
AW ";X;",";Y
  95 RETURN
  97 IF PRINT=1 THEN  LPRINT "CO
RRECTION": LPRINT "PLOT ";CX;","
;CY
  98 RETURN
```

Lines 60-98 Set up the printer routines.

```
 100 PAPER 6: INK 0: BORDER 7: C
LS
 101 LET PRINT=0: LET CFLAG=0: L
ET XCOR=0: LET YCOR=0
 102 PRINT AT 10,0;" DO YOU REQU
IRE A PRINTOUT OF     THE CO-ORDI
NATES ?": PRINT " ENTER Y(Yes) o
r N (No)": PRINT '" NB: PRINTER
MUST BE ATTACHED.": INPUT I$: IF
 I$="Y" THEN  LET PRINT=1
```

Lines 100-102 Set up the start variables and the 'printer toggle' variable.

```
 103 CLS
 105 PRINT '" YOUR DRAWING CAN B
E OVERLAID     WITH A GRID OF SQU
ARES OF ANY    CONVENIENT SIZE. T
HESE SHOULD    BE NUMBERED UP AND
 ACROSS FROM   THE BOTTOM LEFT CO
RNER."
 106 PRINT '" THE NUMBERS ACROSS
 ARE THE              ""X"" CO-ORDIN
ATES": PRINT " THE NUMBERS UPWAR
DS ARE THE            ""Y"" CO-ORDI
NATES": PRINT '" ""X"" CO-ORDINA
TES (ACROSS) ARE": PRINT " ALWAY
S ENTERED FIRST."
```

Lines 103-106 Print up some brief instructions on-screen.

```
 107 PRINT '' PAPER 7;" PLEASE E
NTER THE X AND Y            CO-ORDIN
ATES OF THE BOTTOM          LEFT HAN
D CORNER.                   ": PLOT 2
,2: DRAW 0,171: DRAW 251,0: DRAW
 0,-171: DRAW -251,0
 108 INPUT "X = ";XCOR;" Y = ";Y
COR
 109 CLS
```

Lines 107-109 Request the first set of X and Y co-ordinates.

```
 110 LET UX=0: LET UY=0
 150 PRINT '" NOW ENTER THE X CO
-ORDINATE OF  THE BOTTOM RIGHT H
AND CORNER."
 160 INPUT "X = ";TUX: LET TUX=T
UX-XCOR: IF TUX<=UX THEN  BEEP .
1,60: GO TO 160
```

Lines 110-160 Request the second set of X and Y co-ordinates.

```
 170 LET TUY=(TUX-UX)*175/(255-U
Y)
 175 LET TTUY=TUY+YCOR: LET TTUX
=TUX+XCOR
 176 CLS
 180 PRINT ''''''"        TOP RIGHT
 CORNER WILL BE                 ";T
TUX;" ACROSS": PRINT "
  ";TTUY;" UP"
 190 PRINT ' PAPER 7;"        IS T
HAT SATISFACTORY?            PRESS
 Y (Yes) or N (No)       "
 200 IF INKEY$<>"" THEN  GO TO 2
00
 210 LET i$=INKEY$: IF i$="" THE
N  GO TO 210
 220 IF i$="n" OR i$="N" THEN  G
O TO 1
```

Lines 170-220 Print the grid size, and ask if the size is suitable for the illustration you wish to copy on-screen.

```
 225 LET PROP=175/TUY
 230 LET ESCAPE=0: IF UX<=0 OR U
Y<=0 THEN  LET ESCAPE=999
 235 IF TUX>=ESCAPE THEN  LET ES
CAPE=INT (TUX+10)
 240 PRINT '"          PLEASE REMEMB
ER                    THIS NUMBER "
; BRIGHT 1;ESCAPE
 250 PRINT "          WHICH WILL RET
URN YOU               TO THE MENU"
 255 LET ESCAPE=ESCAPE+XCOR
 260 PRINT AT 21,0;"    PRESS ANY
 LETTER TO START"
 265 IF INKEY$<>"" THEN  GO TO 2
65
 270 LET I$=INKEY$: IF I$="" THE
N  GO TO 270
 280 CLS
```

Lines 225-280 Evaluate and print the escape number.

```
 290 POKE 23658,8: GO SUB 70: PR
INT AT 8,0;k$: INPUT "MENU INSTR
UCTION LETTER? "
 291 IF INKEY$<>"" THEN  GO TO 2
91
```

tions after translation.) If you answer 'Yes' to this option, you'll need to have your printer (ZX Printer, Alphacom 32, or any other printer that recognises LPRINT) connected.

You'll then be asked to enter the X and Y co-ordinates of the bottom left and bottom right of the X-axis. The program will then work out the scale, and tell you how many squares high it can allow the picture to be (so that the whole of the picture can be fitted to scale on the TV's screen). If the maximum height of the picture area fits in with your scaled drawing, then you can continue; if it doesn't, you'll have to start again, juggling the X-axis to suit (increasing the number of squares in the X-axis proportionally increases the number of squares in the Y-axis).

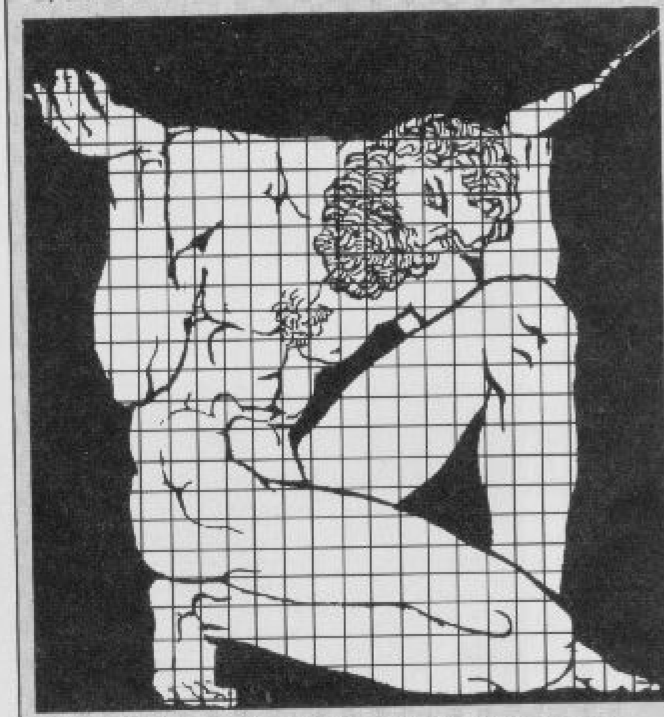
Now you've decided on the correct scale, you'll be given a number to remember — this acts as an escape number bringing you back to the menu at any time. Normally, the number allocated to this will be '999' (just like the police emergency number), but if '999' is a number that you could tap in as a co-ordinate, the program will assign you a different escape number. If you have trouble with numbers, write it down so you won't forget it at a vital moment in your artistic creation.

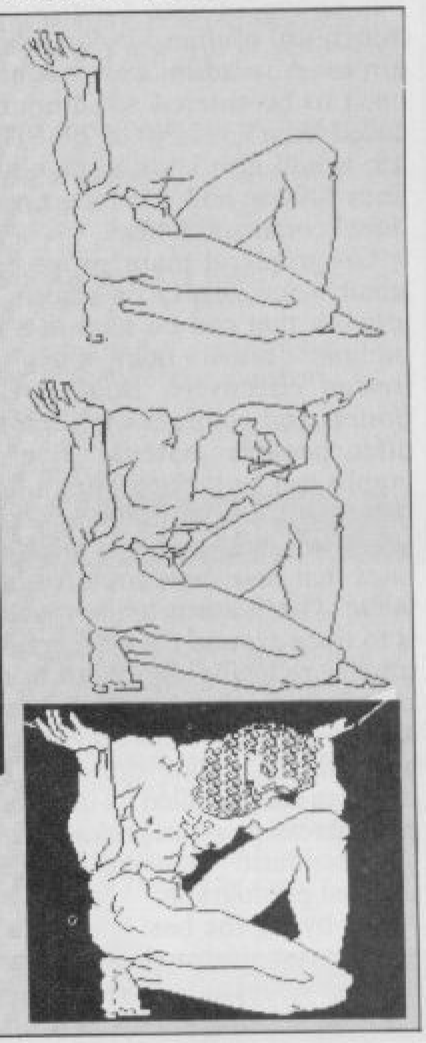
THE FINAL TOUCHES

I'd suggest that once you've scaled your picture, you save it to tape. You could then re-load it into one of the many graphics packages (*Melbourne Draw*, for instance) and play around with colour, fill in the outlines, and so on.

This program is not intended to compete with other graphics programs, but it's hoped that it will prove a useful addition to the facilities they offer. The program will operate with both the 16K and 48K Spectrum; 48K owners may like to elaborate their version with a 'Paint

QUICK ON THE DRAW?





To the right, you'll see the author's attempt at reproducing the above illustration of Atlas using his Pantograph program. You can see the various stages of development and, yes, it did take a while to complete . . . but, with the help of a graphics package to add the finishing touches, the final picture almost looks better than the original!

```
 293 LET M$=INKEY$: IF M$="" THE
N  GO TO 293
```

Lines 290-293 This routine marks the beginning of the main program.

```
 294 IF M$<>"W" AND M$<>"J" AND
M$<>"R" AND M$<>"K" AND M$<>"D"
AND M$<>"C" AND M$<>"S" AND M$<>
"L" AND M$<>"P" AND M$<>"F" THEN
  GO TO 291
```

Line 294 Checks to see if the menu input is valid.

```
 296 GO SUB 60
 297 IF M$="R" THEN  GO TO 460
 298 IF M$="J" THEN  LET PRINT=1
: GO TO 1010
 300 IF M$="C" OR M$="c" THEN  L
ET CFLAG=1: PLOT  OVER 1;CX,CY:
LET X=CEX: GO TO 1070
 310 IF M$="D" THEN  GO TO 1000
 315 IF M$="K" THEN  LET PRINT=0
: GO TO 1010
 320 IF M$="P" THEN  COPY : GO T
O 290
 330 GO TO (CODE M$*10)+9000
```

Lines 296-330 Send the program to the relevant subroutine depending on which key you pressed.

```
 400 FOR I=1  TO LEN X$: IF CODE
 X$(I)<>46 AND CODE X$(I)<48 OR
CODE X$>57 THEN  LET X=UX-1: RET
URN
 405 NEXT I
 410 LET X=VAL X$: RETURN
 420 FOR I=1  TO LEN Y$: IF CODE
 Y$(I)<>46 AND CODE Y$(I)<48 OR
CODE Y$>57 THEN  LET Y=UY-1: RET
URN
 425 NEXT I
 430 LET Y=VAL Y$: RETURN
 455 STOP
 460 INPUT "ARE YOU SURE? Y or N
";i$: IF i$="Y" THEN  RUN
 470 GO TO 290
1000 REM PLOT ROUTINE
1010 INPUT "START POINT ACROSS="
;X$: GO SUB 400: LET X=X-XCOR: I
F X<UX OR X>TUX AND X<>ESCAPE-XC
OR-XCOR THEN  BEEP 1,55: GO TO 1
010
1011 IF X=ESCAPE-XCOR-XCOR THEN
 GO TO 290
1012 INPUT "START POINT UPWARDS=
";Y$: GO SUB 420: LET Y=Y-YCOR:
IF Y<UY OR Y>TUY THEN  BEEP 1,55
: GO TO 1011
1015 LET X=X*PROP
1020 LET Y=Y*PROP
1030 PLOT X,Y: LET OLDX=X: LET O
LDY=Y: GO SUB 80
1040 INPUT "NEXT POINT ACROSS ";
X$: GO SUB 400: LET X=X-XCOR: IF
 X<UX OR X>TUX AND X<>ESCAPE-XCO
R-XCOR THEN  BEEP 1,55: GO TO 10
40
1045 IF X=ESCAPE-XCOR-XCOR THEN
 GO TO 290
1046 INPUT "NEXT POINT UPWARDS "
;Y$: GO SUB 420: LET Y=Y-YCOR: I
F Y<UY OR Y>TUY THEN  BEEP 1,55:
 GO TO 1046
1050 LET X=X*PROP: LET X=X-OLDX
1060 LET Y=Y*PROP: LET Y=Y-OLDY
1065 LET CX=OLDX: LET CY=OLDY
1066 LET CEX=X
1070 DRAW  OVER 1;X,Y: LET OLDX=
PEEK 23677: LET OLDY=PEEK 23678:
 IF CFLAG=1 THEN  PLOT CX,CY: LE
T OLDX=CX: LET OLDY=CY: LET CFLA
G=0: GO SUB 97: GO TO 1080
1071 GO SUB 90
1080 GO TO 1040
```

Lines 400-1080 Contain the subroutines for all the menu options.

```
8000 LET k$="▛▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀
▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▜"
8010 LET k$=k$+"▌ R = RESTART   J
 = START LPRINT▐"
8020 LET k$=k$+"▌ P = COPY  K =
CANCEL LPRINT   ▐"
8040 LET k$=k$+"▌ C = CANCEL LAS
T LINE DRAWN    ▐"
8050 LET k$=k$+"▌ S = SAVE THE P
ICTURE TO TAPE  ▐"
8060 LET k$=k$+"▌ L = LOAD A PIC
TURE FROM TAPE  ▐"
8065 LET k$=k$+"▌ D=DRAW    W=WO
RDS   F=FINISH  ▐"
8070 LET k$=k$+"▙▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄
▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▟"
8080 RETURN
9494 STOP
9495 INPUT i$: IF i$<>"KAMTIN" T
HEN  RUN
9496 STOP
9700 CLS : PRINT AT 10,0; PAPER
7; INK 2;"    © 1984 CHRIS SOMER
VILLE     ": PRINT AT 20,0;"
    PRESS R TO RESTART": PRINT "
         PRESS C TO CLEAR"
9710 IF INKEY$<>"" THEN  GO TO 9
710
9720 LET I$=INKEY$: IF I$="" THE
N  GO TO 9720
9730 IF I$="C" THEN  RANDOMIZE U
SR 0
9740 RUN
```

Lines 8000-9740 Print up the menu table on-screen requesting the option you want to use.

```
9760 INPUT "PICTURE NAME ?";I$:
IF LEN I$>10 THEN  GO TO 9760
9770 LOAD I$SCREEN$ : GO TO 290
9830 INPUT "PICTURE NAME =";I$:
IF LEN I$>=10 THEN  GO TO 9830
9840 SAVE I$SCREEN$ : GO TO 290
```

Lines 9760-9840 Contain the 'load' and 'save' routines.

```
9870 INPUT "LINE(0-21)=";L$;"ROW
(0-31)=";R$: FOR I=1 TO LEN R$:
IF CODE R$(I)<48 OR CODE R$(I)>5
7 THEN  BEEP .5,55: GO TO 9870
9871 NEXT I
9872 FOR I=1 TO LEN L$: IF CODE
L$(I)<48 OR CODE L$(I)>57 THEN
BEEP .5,55: GO TO 9870
9873 NEXT I
9874 LET R=VAL R$: LET L=VAL L$:
 IF L<0 OR L>21 OR R<0 OR R>31 T
HEN  BEEP 1,55: GO TO 9870
9875 INPUT "TEXT=";T$: PRINT  OV
ER 1;AT L,R;T$: INPUT "IS THAT O
K Y? N?";I$: IF I$="N" THEN  PRI
NT  OVER 1;AT L,R;T$: GO TO 9870
9878 GO TO 290
```

Lines 9870-9878 Provide the 'test printing' subroutine.

```
9980 SAVE "D" LINE 1
9982 SAVE "D" LINE 1
9983 STOP
```

Lines 9980-9983 Save two copies of the program.

EVERY PICTURE TELLS A STORY

Fill' option, or even a cursor controlled 'touch-up' routine for correcting minor errors. Any additional routines would need to be entered as subroutines and called from lines 290 to 294. The menu, k$, would also have to be altered (see lines 8000 to 8070) to incorporate additional command letters.

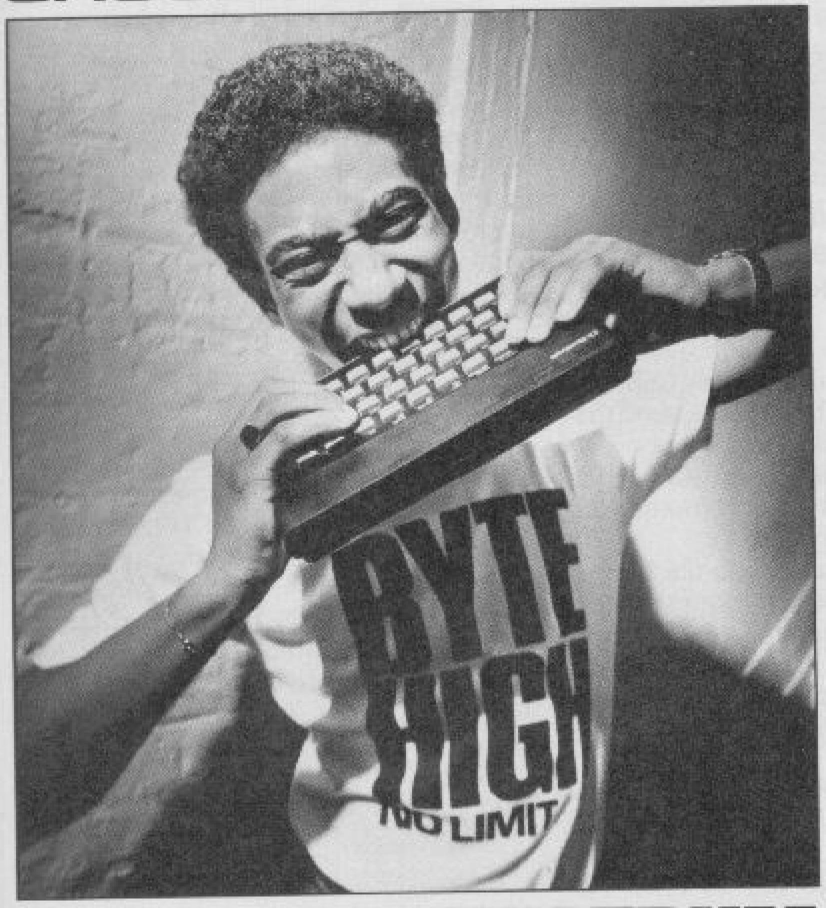
Geographical maps prove eminently suitable for display on-screen, but any artwork that can be seen as a series of outlines (rather than tones) can be treated effectively. Book covers, pop posters and comic book illustrations all offer possible material. Even photographs can be tackled after a fashion — just make sure you choose only those prints that have strong constrast, that is ones that have bold areas of black and white. The best way to approach a photo is to trace around the bold areas of contrast — reducing the photo to a sort of contour map showing the light and dark areas — and then square up and enter it as an ordinary outline drawing. The outlines can later be filled in, using one of the commercial graphics packages, to give an 'impressionist' interpretation of the original photograph.

But by far the best way to tackle the program is to just wade in and start drawing. I'm no artist, but I'm well proud of some of my creations ... YS

MENU OPTIONS

KEY	COMMENT
C	Pressing 'C' (the 'CORRECTION' key) simply deletes the previous drawing position. Thus, if you make a mistake, you can return to the menu, press 'C' and continue where you left off.
D	Once you press 'D' (the 'DRAW' key) you'll be asked to provide the co-ordinates of the starting position, and of each subsequent position you want to draw a line to. It's rather like those 'join the dots' mystery pictures in childrens' books, only in this case you're specifying where each dot is to go and the Spectrum's connecting them together. It's unlikely that all the points you'll want to draw to will fall conveniently on your grid lines, but the program will happily accept positions like X=1222.5, Y=16.8. At this point, it's worth making a note that when you're planning the initial grid of squares, the finer your grid the more detail you can introduce to the final on-screen drawing. On the other hand, if all you're after is a broad outline, then a relatively small number of large squares should suffice. Once you reach the end of a line and want to move on to a new starting position, simply type in the escape number and return to the menu to start over. (Unlike the normal Spectrum DRAW procedure, there's no calculation involved — you read off the co-ordinates for each point that's connected on the original drawing and it'll be reproduced to the scale you want.)
F	Press this key when you want to stop using the program.
J/K	These two keys are used to activate ('J') or cancel ('K') the instruction to print out co-ordinates to the printer.
L	This command loads back a previously saved picture. If you're planning to load back a partially finished picture, you'll have to enter the original co-ordinates applicable before you can continue drawing.
P	The 'P' key allows you to print the picture on-screen to the ZX Printer (or any other printer than accepts the COPY command).
R	This key is used to re-start the program, once you've finished with one drawing and want to start on another.
S	Making use of the SAVE SCREEN$ function, the 'S' key saves the screen picture to cassette.
W	The 'W' key allows you to print a text label at any specified position on the screen. This function used the familiar screen PRINT AT positions for line (0 to 21) and row (0 to 31).

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Memory — 64K bytes of RAM; 4K bytes of ROM
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MACHINE CODE COMMANDS

MC²

Being able to access Basic commands from machine code is not always as easy as it sounds, especially when dealing with Microdrives and the like. Join* David Threlfall *as he rummages around in the Spectrum's ROM.

There are many functions on the ZX Spectrum that are not easy to use from machine code. The simple PLOT, colour and AT features are straightforward. Tape commands such as SAVE and LOAD are a little more difficult, but the Interface 1 commands for Microdrive, RS232 and streams are almost impossible without a very detailed understanding of the ROM routines involved.

The technique to be described here isn't generous enough to allow the spectacular gains in speed you would normally expect from machine code However, it is very simple to use and there's no advantage in speeding up the rate at which you get to the Microdrive routines when the drives themselves have an access time of several seconds.

The method is simply to build a tokenised version of the command to be executed in the Basic input line area (pointed to by the system variable E__Line). The steps involved are as follows:

1. Clear out all the areas above the input area. This will also empty the workspace and floating point stack.
2. Make space for your command in the input buffer.
3. Build the command into the buffer — this will usually be just a question of copying into that area.
4. Manipulate the error stack pointer (ERR__SP) so that the machine will return to your routine whatever happens.
5. Call the ROM routine which evaluates a single line of Basic.
6. On return, clear work areas and test the error flag. If there was an error go back to Basic.

The assembler listing provided is all that's necessary; it's fairly short and all Basic commands can be operated on in the same way. The code is liberally commented, but a few more notes would undoubtedly be helpful.

CODE	ASSEMBLER	COMMENTS
	LD HL,TEXT	Make HL point to the required Basic code.
	CALL BASIC	Call this routine from your machine code.
	RST 8	Return to command mode with error '0'.
DEFB	255	
BASIC	PUSH HL	
	CALL 5808	Use a ROM routine to tidy up the buffers.
	LD HL,(23641)	Point HL at the system variable E__LINE.
	LD BC,130	Make 130 bytes of space in the input buffer.
	CALL 5717 INC HL	Make space routine in ROM.
	EX DE,HL	Move HL into DE for an LDIR.
	POP HL	Point HL to our Basic text.
	LD BC,128	Maximum length of text.
	LDIR	Move text to the input buffer.
	SET 7,(IY+48)	Signal line execution.
	LD (IY+0),255	Clear any old errors.
	LD (IY+10),1	Set the NSPPC system variable to the first statement.
	LD HL,(23613)	Keep the value of ERR__SP (error stack pointer) for later repair.
	PUSH HL	
	LD HL,BACK	BACK is a return address.
	PUSH HL	Put HL on the stack in case of error return.
	LD (23613),HL	Keep the stack pointer in ERR__SP
	CALL 7050	Call the 'line evaluation' routine.
	POP HL	If we return here then discard this value.
BACK	POP HL	May return here if there is an error.
	LD (23613),HL	Put ERR__SP back again.
	CALL 5808	Tidy the buffers.
	LD A,(23610)	Was there an error? Look in ERR__NO.
	CP 255	255 is OK.
	JP NZ,4867	If not, jump back to Basic.
	RET	Return to the calling routine.
TEXT		Your TEXT goes here in an assembler string.
DEFB	13	Terminate the string with carriage return.

The complicated manipulation of the stack pointers and error pointer (ERR__SP) is not necessary unless you plan to use Interface 1 commands. If you don't follow this method then only the first use of this facility will work and the command may not return to your routine at all, even after successful execution.

The routine 'BASIC' has been written so that it's called with the HL register pair pointing to the tokenised version of the command which you wish to have executed. This allows the routine to be used repeatedly, with different commands if necessary. In all cases, the last byte of the command must be that representing carriage return (13 decimal).

Most Spectrum users will be aware that numbers are stored in a rather odd way in Sinclair Basic. First, there are the ASCII characters making up the number, then the single byte 14 followed by the five byte binary representation of the number. The ASCII form is converted to binary form during syntax checking. If we want to avoid this checking, some way has to be found which doesn't entail us translating any numbers we use into binary. Fortunately there *is* a way, using the VAL function. Simply write numbers as VAL "number"; for example, if we intend to include the number 500 in the code to be executed, we need only write VAL "500".

FOR EXAMPLE . . .

There are many uses for this routine, but for now I'll give just two examples. Say you wish to SAVE 3000 bytes of code starting at location 50000 into a cassette file called "fred". The normal Basic command would be:

```
SAVE "fred" CODE 50000,3000
```

To execute this from machine code we can insert:

```
SAVE "fred" CODE VAL "50000",
VAL "3000"
```

At label TEXT in the assembler listing. Note that the word 'SAVE' is inserted with its token value (248), as are all the other keywords like CODE and VAL.

The second example is both more complicated and more useful. It's difficult to use the line editor on the Spectrum for reading a string of characters, but the following code inserted at TEXT will read in a$ and put it at locations 30000 upwards — allowing you to access it from your machine code (the byte '0' marks the end of the string):

```
INPUT a$:FOR k=VAL "1" TO LEN a$:
POKE VAL "29999"+k, CODE a$(k): NEXT k:
POKE k+VAL "30000", VAL "0"
```

The only restriction imposed is that the total length of the input line must be less than 128 characters. This can be increased very easily by making more space and copying more with the LDIR.

Finally, there's no way back to Basic from here — because we've erased the input buffer, upset the Basic code pointer and destroyed the floating point stack. These are all repairable, but a RST 8 return to Basic is safe and simple.

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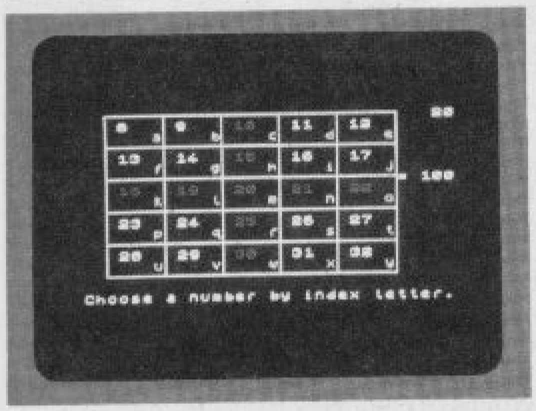
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MAGIC NUMBERS

BY M LOFTUS



In *Magic Numbers*, you've to choose five numbers from the 25 available. Trouble is, once you've chosen one, the program won't let you choose another number from the same row or column. Here we see the number 20 has been chosen.

This program demonstrates the magical mystery of the ZX Spectrum. You won't be able to conjure a rabbit out a hat, but you should be able to dazzle your friends with a clever piece of number manipulation.

You're asked to choose a number between 60 and 4290. Once you've typed in the mystery number, the Spectrum generates a five by five grid of seemingly random numbers. You then have to choose five numbers; as each number's chosen, the row and column it comes from are erased from the screen, decreasing the amount of numbers you have to choose from. When all five numbers have been chosen from the grid, the Spectrum adds them together and compares the result to the number you chose at the outset of the program to see if they're the same. And 'Hey Presto!' ... they *are* the same.

To say more of the program's inner workings would spoil all the fun. See if you can work it out for yourself ...

```
  1 GO SUB 1000
```

Line 1 GO SUBs to the subroutine that prints up the instructions for play on-screen.

```
 100 INPUT "Integer Please (60-4920) ";f
 110 IF f<>INT f OR f<60 OR f>4920 THEN  GO T
O 100
```

Lines 100-110 Ask you to input any integer between 60 and 4290. Line 110 checks that your answer is valid.

```
 120 BEEP .1,16: PRINT AT 7,27;"=";AT 7,(28+(
2 AND f<100)+(1 AND f>99 AND f<1000)); BRIGHT
 1;f
 130 DIM a(5,5)
 140 LET k=(f-60)/5
 150 FOR z=1 TO 5
 160 FOR y=1 TO 5
 170 LET a(z,y)=INT k+5*(z-1)+y-1+(5*(k-INT k
) AND y=5)
 180 PRINT AT 3*z,5*y+1; INK 5;CHR$ (96+5*(z-
1)+y)
 190 PRINT AT 3*z-1,5*y-2; BRIGHT 1; INK 7;a(
z,y): BEEP .07,5*z+y-20
 200 NEXT y
 210 NEXT z
 220 FOR z=0 TO 5
 230 PLOT 16,164-24*z: BEEP .06,3*z
 240 DRAW 200,0
 250 PLOT 16+40*z,164: BEEP .03,3*z+2
 260 DRAW 0,-120
 270 NEXT z
 280 FOR u=32 TO 48: BEEP .05,u: NEXT u
```

Lines 120-280 Print up the grid of numbers on-screen.

```
 290 PRINT AT 18,0;"Choose a number by index
letter."
 300 DIM g(5,2)
 310 FOR z=1 TO 4
 320 LET i=CODE INKEY$-96
 330 IF i<1 OR i>25 THEN  GO TO 320
 350 LET r=INT (i/5+.9)
 360 LET c=i-5*(r-1)
 370 IF g(r,1)<>0 THEN  BEEP 1,16: GO TO 320
 380 IF g(c,2)<>0 THEN  BEEP 1,16: GO TO 320
 390 BEEP .2,i
 400 LET g(r,1)=1
 410 LET g(c,2)=1
 420 FOR q=1 TO 5
 430 PRINT AT 3*r-1,5*q-2; INK 2;a(r,q)
 440 PRINT AT 3*q-1,5*c-2; INK 2;a(q,c)
 450 BEEP .01,q: BEEP .02,8*q
 460 NEXT q
 470 PRINT AT z,28;"+";AT 1,28;" ";AT z,(29+(
2 AND a(r,c)<10)+(1 AND a(r,c)>9 AND a(r,c)<1
00)); BRIGHT 1;a(r,c)
 480 NEXT z
```

Lines 290-480 Ask you to select a number by its index letter. This number is added to the total number of selected numbers, and the colour of all the numbers in that row and column are changed.

```
 490 PRINT AT 18,0;"Transferring the last num
ber..."
 500 FOR z=1 TO 5
 510 BEEP .5,10*z
 520 IF g(z,1)=0 THEN  LET r=z
 530 IF g(z,2)=0 THEN  LET c=z
 540 NEXT z
 550 PRINT AT 5,28;"+";AT 5,(29+(2 AND a(r,c)
<10)+(1 AND a(r,c)>9 AND a(r,c)<100)); BRIGHT
 1;a(r,c)
 560 PRINT AT 3*r-1,5*c-2; INK 2;a(r,c)
 570 PRINT AT 18,0; INK 6;"Now,  add up the l
ist of numbers    that you chose at random.
     The total is ... ";f;" !"'"       YOUR OR
IGINAL  NUMBER!    "
 580 FOR n=54 TO 64: BEEP .01,RND*30: OUT 254
,n/8: NEXT n
 590 PRINT £0;"Press 1 to try again"
 600 PAUSE 0
 610 IF INKEY$="1" THEN  RUN 100
 620 STOP
```

Lines 490-620 This routine transfers the number left and totals selected numbers. Funnily enough, the total always comes out as

your original number ... don't ask me, I'm as stumped as you probably are!

```
1000 REM XX Instructions XX
1010 PRINT AT 11,10; FLASH 1; INK 8;"STOP THE
 TAPE": BEEP 2,24
1020 BORDER 1: INK 5: PAPER 1: CLS
1030 PRINT "This program asks you to enter an
umber.  A 5x5 grid of computer-generated numb
ers is displayed &"
1040 PRINT "you are asked to  select  one oft
hem.You indicate your selectionby typing the
index letter whichoccupies the same square as
 yourselection."
1050 PRINT '"   After your selection has been
accepted, all the numbers in thesame row & th
e same column  willchange colour.  However, y
ou maycontinue  to choose any  of  thebright
numbers that remain."
1060 PRINT '"  Try to choose a set of numbers
such that the sum of the numbersis  not  equa
l  to your originalnumber:--- and the best of
 luck!"
1070 PRINT '; INK 2;"   PRESS ANY KEY TO CONT
INUE"
1080 PAUSE 0: BORDER 0: PAPER 0: INK 7: CLS
1090 POKE 23609,50
1100 RETURN
```

Lines 1000-1100 This is the subroutine that prints up the instructions for play on-screen. Line 1090 generates a keyboard 'blip'.

MODE MUSIC

BY MAURICE DAVID WOOD

This program isn't really so much about music, rather it's about providing an aural indication of the mode you're in. Using this machine code routine, you'll get a different sounding keyboard 'blip' for each cursor mode, that is 'E', 'C', 'K', 'G' and 'L' modes. As an added extra, I've even added another sound for every time you hit the Enter key.

The program must be entered *carefully* in three parts. The first section of code to enter is the one-line Basic loader; once typed in, this should be SAVEd to cassette. Now, type in the Hex loader provided and RUN it. The program will ask you to enter the machine code data in groups of eight Hex pairs (without spaces); once you've entered each pair, press the Enter key. After you've entered all eight Hex pairs, type in the three or four digit number at the end of each line; this is a checksum value — if this one goes in OK, you can assure yourself that the code for that line has been entered successfully.

Once you've entered all the Hex code, follow the instructions given in the Hex loader to SAVE the code after the one-line Basic loader. You can now reset the machine (and for all you lucky souls with a Speccy+, just press that reset button) and load the tape as normal.

Once the tape has loaded the code back into the Spectrum, you can turn the sound effects on using the command RANDOMIZE USR 65106; to turn it all off, type RANDOMIZE USR 65120. OK, so it does sound a bit like one of the checkout tills in a supermarket, but it does provide useful feedback as to which mode you're in at any time.

```
   1 CLEAR 64739: LOAD ""CODE : RANDOMIZ
E USR 65105
```

Here is the one-line Basic loader. Type this into your Spectrum and SAVE it on to a cassette.

```
   1 REM HEX Loader for different mode bleeps
   5 POKE 23658,8
   9 CLEAR 60000
  10 FOR i=64740 TO 65140 STEP 8
  20 LET cs=0
  30 PRINT AT 0,0;"Address ";i
  40 INPUT "Hex 8 Bytes", LINE a$
  60 IF LEN a$<>16 THEN  GO TO 1000
  80 LET f=0: FOR j=1 TO 16
  90 IF (a$(j)<"0" OR a$(j)>"9") AND (a$(j)<"
A" OR a$(j)>"F") THEN  LET f=1
 100 NEXT j
 102 IF f=1 THEN  GO TO 1000
 105 FOR n=0 TO 7
 120 LET y=CODE a$(1)-48: IF y>9 THEN  LET y=
y-7
```

```
 130 LET z=CODE a$(2)-48: IF z>9 THEN  LET z=
z-7
 140 LET va=16*y+z
 150 LET cs=cs+va
 160 POKE i+n,va
 165 PRINT AT 2,n*3;a$( TO 2)
 170 LET a$=a$(3 TO )
 180 NEXT n
 183 INPUT "Checksum "; LINE a$
 184 PRINT AT 2,25;A$
 185 IF VAL a$<>cs THEN  GO TO 1000
 187 CLS
 190 NEXT i
 200 CLS : PRINT "SAVE CODE AFTER BASIC LOADE
R."''"REMOVE EAR LEAD"
 210 SAVE "IM 2 BEEP"CODE 64740,408
 220 CLS : PRINT "VERIFYING"
 230 VERIFY ""CODE
 240 CLS : PRINT "ALL OK": STOP
1000 PRINT AT 15,0;"ERROR": GO TO 20
```

This is the Hex loader you'll need to load all the Hex code. Simply type this in and RUN it. Full instructions are given for you to follow on loading the code and, once you've completed the task, how to SAVE it all to tape.

```
Hex Dump For Different Mode Bleeps
==================================

64740  21 08 5C 7E 36 00 21 5F =441
64748  FE 77 AF 7E FE 00 CA 50 =1210
64756  FE 7E FE 0D CA 36 FD AF =1331
64764  7E FE E6 D2 BC FD AF 7E =1514
64772  FE 80 D2 0C FD C3 13 FD =1324
64780  AF 7E FE A4 DA BE FD AF =1555
64788  7E FE 61 D2 1D FD C3 24 =1200
64796  FD AF 7E FE 7B DA DE FD =1624
64804  AF 7E FE 41 30 02 18 07 =701
64812  AF 7E FE 5B DA FD FD C3 =1565
64820  25 FE F5 11 10 00 21 C8 =802
64828  00 CD B5 03 11 10 00 21 =455
64836  98 00 CD B5 03 11 10 00 =574
64844  21 C8 00 CD B5 03 11 10 =655
64852  00 21 98 00 CD B5 03 11 =591
64860  10 00 21 C8 00 CD B5 03 =638
64868  11 10 00 21 98 00 CD B5 =604
64876  03 11 10 00 21 C8 00 CD =474
64884  B5 03 11 10 00 21 98 00 =402
64892  CD B5 03 11 10 00 21 C8 =655
64900  00 CD B5 03 F1 C3 4B FE =1154
64908  F5 11 10 00 21 08 01 CD =525
64916  B5 03 11 10 00 21 F8 00 =498
64924  CD B5 03 11 10 00 21 E8 =687
64932  00 CD B5 03 11 10 00 21 =455
64940  D8 00 CD B5 03 11 10 00 =638
64948  21 C8 00 CD B5 03 F1 C3 =1058
64956  4B FE F5 11 10 00 21 FC =892
64964  01 CD B5 03 11 10 00 21 =456
64972  28 01 CD B5 03 11 10 00 =463
64980  21 FC 01 CD B5 03 F1 C3 =1111
64988  4B FE F5 11 10 00 21 C8 =840
64996  00 CD B5 03 11 10 00 21 =455
65004  C6 05 CD B5 03 11 10 00 =625
65012  21 28 02 CD B5 03 F1 18 =729
65020  4E F5 11 10 00 21 B4 01 =570
65028  CD B5 03 11 10 00 21 C8 =655
65036  00 CD B5 03 11 10 00 21 =455
65044  D0 0A CD B5 03 11 10 00 =640
65052  21 F8 00 CD B5 03 F1 18 =935
65060  26 F5 11 10 00 21 C8 02 =551
65068  CD B5 03 11 10 00 21 64 =555
65076  01 CD B5 03 11 10 00 21 =456
65084  C8 00 CD B5 03 11 10 00 =622
65092  21 78 00 CD B5 03 F1 21 =816
65100  08 5C 36 00 C9 21 08 5C =488
65108  36 00 3E 09 ED 47 F3 ED =913
65116  5E FB C9 00 3E 3F ED 47 =979
65124  F3 ED 56 FB C9 F3 F5 C5 =1703
65132  D5 E5 DD E5 CD E4 FC DD =1798
65140  E1 E1 D1 C1 F1 C3 3B 00 =1344
```

Once you've got the Hex loader running, you have to enter each of the Hex pairs (going horizontally across the list) pressing Enter after each pair. Once you've entered eight Hex pairs, you'll be asked to enter the three or four digit number from the ninth column, which is the checksum.


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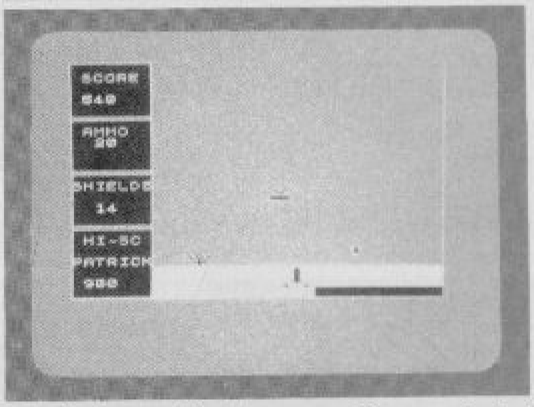
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PROTECTOR

BY PATRICK DONNELLY



As Private in the Intergalactic Army, you've to control the laser base in an effort to destroy all the aliens swooping down from the top of the screen. On-screen scoring is indicated in the box to the left of the playing area.

Here's a game for the more military-minded of you! As a Private in the Intergalactic Army, you're in charge of the laser base that's been ordered to defend the space station, Speccy3. The invading alien hordes are throwing all the hardware they can at you, including R3 and K6 fighters, as well as the deadly XTC missiles. All you have to do is shoot them out of the sky before they explode against the walls of the space station.

Speccy3 starts off with 25 shields to protect it, but one is lost each time an enemy fighter or missile breaks through the defences. You gain 50 points for each enemy craft you shoot down, but you'll lose 10 points for each one that explodes against the space station's walls. You'll be promoted through Corporal, Sergeant and Captain to General, depending on the score you're left with when the game's ended.

On RUNning the program, once you've read your way through five pages of on-screen instructions, the playing area is taken up with a panel indicating your current score, the amount of ammunition you've got on-board the laser base, the number of shields the space station has left, and the overall 'high score'. At the foot of the playing area, you're allocated a single laser base, that you control using the 'Q' key to move left, the 'W' key to go right and the Space key to fire a laser bolt.

```
   2 BORDER 5
   8 BEEP .5,5
  10 CLEAR : CLS
  20 BORDER 5
  30 GO SUB 9800: REM CREATES USER DEFINED CH
ARS :
  40 GO SUB 8500: REM PRINTS THE INSTRUCTIONS
  50 POKE 23658,8: REM ACTIVATES CAPS-LOCK
  80 BORDER 5
```

Lines 2-80 Set the BORDER and PAPER colours, and call two subroutines. The first, at line 9800, creates the user-defined graphics. The second subroutine, at line 8500, prints up the instructions for play on-screen.

```
 110 DIM A$(5,7): DIM R$(6,8): DIM B(5): REM
ARRAYS FOR HIGH-SCORE TABLE
 120 FOR N=1 TO 5: LET A$(N)="PATRICK": LET R
$(N)="PRIVATE ": LET B(N)=1000-N*100: NEXT N:
 REM INITIALISES HIGH SCORE TABLE
```

Lines 110-120 Set up the 'high score' table and fill it with the initial high scores (which just happen to be by Patrick himself!). Of course, you could always type your own name in instead ...

```
 130 REM SETS UP OTHER VARIABLES NEEDED FOR T
HE GAME
 140 LET Y1=12: LET Y2=20: LET Y3=15: LET X1=
0: LET X2=0: LET X3=0
 150 LET TT=0: LET YO=11 : LET Y=99
 160 LET TEST=300: LET SD=32: LET TEST1=0: LE
T SC=0: LET SH=20
 200 REM ************************
 210 GO SUB 8000: REM CREATES GAME SCREEN
```

Lines 130-210 Set up the initial game variables. (X1, Y1), (X2, Y2) and (X3, Y3) are the positions of the first, second and third attackers. Here's a list of the order variables you should know about: Y — the position of the laser shot; YO — the laser base position; SD — the shields; TEST — the extra ammo condition; TT — the triple points indicator; SC — the score; and SH — the ammo you start with.

```
 400 PRINT  PAPER 6; OVER 0; INK 1;AT 20,11;"
jkl";AT 19,12;"m"
 800 LET X3=0: LET Y3=INT (RND*20)+9: GO TO 9
50
 850 LET TT=INT (RND*7)
 860 LET X1=0: LET Y1=INT (RND*22)+8: GO TO 9
50
 900 LET TT=INT (RND*6)
 920 LET X2=0: LET Y2=INT (RND*22)+8: GO TO 9
50
 990 PRINT  PAPER 5; INK 2;AT X3,Y3;"a";AT X2
,Y2;"cd";AT X1,Y1;"ef"
```

Lines 400-990 Set up the initial enemy positions and print them up on-screen.

```
 995 REM CHECKS ON STATE OF GAME
1010 IF SC>0 THEN  PRINT  BRIGHT 1; PAPER 2;
INK 7;AT 3,1;SC: GO TO 1100
1050 LET SC=0: PRINT  PAPER 2; INK 7; BRIGHT
1;AT 3,1;"00"
1100 PRINT  BRIGHT 1; PAPER 2; INK 7;AT 7,2;S
H;" ": IF SH=0 THEN  PRINT  PAPER 5; INK 7;AT
 12,15;"GAME OVER": GO TO 7200
1200 PRINT  BRIGHT 1; PAPER 2; INK 7;AT 13,2;
SD-7;" ": IF SD=7 THEN  PRINT  PAPER 5; INK 7
;AT 12,15;"GAME OVER": GO TO 7200
1300 IF SC>=TEST THEN  LET TEST=TEST+SC: BEEP
 .5,40: LET SH=SH*2
```

Lines 995-1300 Check the game status. If you want to start looking to change any of the programming at this stage, take a look at lines 1010 and 1050. Each could do with some work ...

```
1350 REM CHECKS TO SEE IF KEY IS PRESSED
1400 IF INKEY$=" " THEN  LET SH=SH-1: GO SUB
6200
1450 IF INKEY$="Q" THEN  GO SUB 6000: REM MOV
ES LASER TO LEFT
1460 IF INKEY$="W" THEN  GO SUB 6050: REM MOV
ES LASER TO RIGHT
```

Lines 1350-1460 Scan the keyboard and jump to the required subroutine depending on whether you've pressed the 'left', 'right' or 'fire' key.

```
1490 REM CHECKS TO SEE IF ANY ATTACKERS HAVE
BEEN HIT BY SHOTS FIRED
1500 IF ATTR (X1,Y1)<>42 OR ATTR (X1,Y1+1)<>4
2 THEN  GO TO 6500
1510 IF ATTR (X2,Y2)<>42 OR ATTR (X2,Y2+1)<>4
2 THEN  GO TO 6700
1520 IF ATTR (X3,Y3)<>42 THEN  GO TO 6600
```

Lines 1490-1520 Check to see if an enemy fighter has been hit, and then jump to the relevant subroutine.

```
1900 REM CHECKS TO SEE IF ANY ATTACKERS HAVE
REACHED THE BOTTOM
2000 PRINT  PAPER 5;AT X1,Y1;"  ";AT X2,Y2;"
 ";AT X3,Y3;" "
2010 LET X3=X3+1: IF X3=19 THEN  PRINT  PAPER
 5; INK 6;AT 17,Y3;"n";AT 18,Y3;"o": BEEP .03
,-10: PRINT  PAPER 5;AT 17,Y3;" ";AT 18,Y3;"
": LET Y3=1: LET SD=SD-1: PRINT  PAPER 4; INK
 2;AT 21,SD;"■": LET SC=SC-10: GO TO 800
2020 LET X1=X1+1: IF X1=19 THEN  PRINT  PAPER
 5; INK 6;AT 17,Y1;"nn";AT 18,Y1;"oo": BEEP .
03,-8: PRINT  PAPER 5;AT 17,Y1;"  ";AT 18,Y1;
"  ": LET Y1=1: LET SD=SD-1: PRINT  PAPER 4;
INK 2;AT 21,SD;"■": LET SC=SC-10: GO TO 850
2030 LET X2=X2+1: IF X2=19 THEN  PRINT  PAPER
 5; INK 6;AT 17,Y2;"nn";AT 18,Y2;"oo": BEEP .
03,-4: PRINT  PAPER 5;AT 17,Y2;"  ";AT 18,Y2;
"  ": LET Y2=1: LET SD=SD-1: PRINT  PAPER 4;
INK 2;AT 21,SD;"■": LET SC=SC-10: GO TO 900
2040 PRINT  PAPER 5; INK 2;AT X3,Y3;"a";AT X2
,Y2;"cd";AT X1,Y1;"ef"
5000 GO TO 1000
```

Lines 1900-5000 Check if any of the attackers have reached the bottom of the screen; if they have, your score and shield levels are reduced. If they haven't reached the bottom of the screen yet, each line of fighters is moved down by one row.

```
5990 REM MOVES LASER TO LEFT
6000 PRINT  PAPER 6;AT 20,YO+2;" ";AT 19,YO+1
;" "
6025 LET YO=YO-1: LET Y=Y-8
```

```
6030 IF YO<8 THEN  LET YO=8
6032 IF Y<75 THEN  LET Y=75
6040 PRINT  PAPER 6; OVER 0; INK 1;AT 20,YO;"
jkl";AT 19,YO+1;"m"
6045 RETURN
```

Lines 5990-6045 Move the laser left, all the while checking to see you're not moving outside the limits set.

```
6049 REM MOVES LASER TO RIGHT
6050 PRINT  PAPER 6;AT 20,YO;" ";AT 19,YO+1;"
"
6075 LET YO=YO+1: LET Y=Y+8
6080 IF YO>28 THEN  LET YO=28
6082 IF Y>235 THEN  LET Y=235
6090 PRINT  PAPER 6; OVER 0; INK 1;AT 20,YO;"
jkl";AT 19,YO+1;"m"
6099 RETURN
```

Lines 6049-6099 Move the laser right, all the while checking to see you're not moving outside the limits set.

```
6200 REM PRINTS THE LASER-SHOTS
6220 INK 7
6240 PLOT Y,24: DRAW 0,141
6245 PLOT Y+1,24: DRAW 0,141
6250 PLOT  OVER 1;Y,25: DRAW  OVER 1;0,140
6255 PLOT  OVER 1;Y+1,25: DRAW  OVER 1;0,140
6280 INK 0
6290 RETURN
```

Lines 6200-6290 Print the laser shots; note that the DRAW command has been used.

```
6490 REM THIS PROCEDURE CALLED WHEN A CRAFT I
S SHOT
6500 LET SC=SC+50
6520 BEEP .1,10
6530 IF TT=4 THEN  LET SC=SC+100: PRINT  PAPE
R 5;AT X1,Y1;"*3": BEEP .05,10
6540 PRINT  PAPER 5;AT X1,Y1;"  "
6580 GO TO 850
6600 LET SC=SC+50
6610 BEEP .25,10
6640 PRINT  PAPER 5;AT X3,Y3;" "
6680 GO TO 800
6700 LET SC=SC+50
6715 BEEP .25,10
6720 IF TT=4 THEN  LET SC=SC+100: PRINT  PAPE
R 5;AT X2,Y2;"*3": BEEP .05,10
6740 PRINT  PAPER 5;AT X2,Y2;"  "
6780 GO TO 900
```

Lines 6490-6780 This routine notes that a craft has been blown out of the sky, so it's removed from the screen and your score is updated.

```
7199 REM THIS PROCEDURES CHECKS IF A HIGH SCO
RE HAS BEEN REACHED IN THE GAME
7200 FOR I=1 TO 15: BEEP .5,25+I: NEXT I
7205 CLS
7208 IF SC<=B(5) THEN  GO TO 7300
7210 IF SC<=1500 THEN  LET R$(6)="PRIVATE "
7215 IF SC>1500 THEN  LET R$(6)="CORPORAL"
7216 IF SC>3000 THEN  LET R$(6)="SERGEANT"
7217 IF SC>4800 THEN  LET R$(6)="CAPTAIN"
7218 IF SC>6800 THEN  LET R$(6)="GENERAL"
```

Lines 7199-7218 Check for high score and calculate the rank you have attained.

```
7225 PRINT AT 2,12;"WELL DONE "
7227 PRINT AT 4,6;"YOU HAVE GOT ONE OF "
7228 PRINT AT 6,6;"TODAYS HIGH SCORES"
7230 PRINT AT 9,2;"ENTER YOUR NAME OR INIATIA
LS": INPUT N$
7231 BEEP .8,31
7232 IF R$(6)="PRIVATE " THEN  GO TO 7240
7234 PRINT AT 12,2;"YOU HAVE NOW BEEN PROMOTE
D TO"
7235 PRINT AT 14,6;"THE RANK OF "
7236 PRINT AT 14,19;R$(6)
7237 PRINT AT 17,8;"CONGRATUALATIONS"
7239 FOR I=1 TO 10: BEEP .4,I: NEXT I
```

Lines 7225-7239 Print out a suitable 'high score' message to the jubilant soldier.

```
7240 IF SC>B(5) THEN  LET B(5)=SC: LET A$(5)=
N$
7250 IF SC>B(4) THEN  LET R$(5)=R$(4): LET R$
(4)=R$(6): LET B(5)=B(4): LET B(4)=SC: LET A$
(5)=A$(4): LET A$(4)=N$
7260 IF SC>B(3) THEN  LET R$(4)=R$(3): LET R$
(3)=R$(6): LET B(4)=B(3): LET B(3)=SC: LET A$
(4)=A$(3): LET A$(3)=N$
7270 IF SC>B(2) THEN  LET R$(3)=R$(2): LET R$
(2)=R$(6): LET B(3)=B(2): LET B(2)=SC: LET A$
(3)=A$(2): LET A$(2)=N$
7280 IF SC>B(1) THEN  LET R$(2)=R$(1): LET R$
(1)=R$(6): LET B(2)=B(1): LET B(1)=SC: LET A$
(2)=A$(1): LET A$(1)=N$
7300 GO SUB 7600: REM PRINTS HIGH SCORE TABLE
```

Lines 7240-7300 This isn't that clever a routine. It's task is to insert the new high score into the table; it does this by moving all those below it down one position. But what happens if you have a ten place 'high score' table? Patrick really should have used a loop here.

```
7310 PRINT  PAPER 3; INK 7; BRIGHT 1;AT 21,3;
"DO YOU WANT TO PLAY AGAIN"
7320 FOR I=1 TO 2000
7330 IF INKEY$="N" THEN  GO TO 9999
7340 IF INKEY$="Y" THEN  GO TO 150
7350 NEXT I
7400 GO TO 150: REM STARTS NEW GAME
```

Lines 7310-7400 This is the message printed up to encourage you to have another go. Trouble is after about 100 games, the machine stack will fill up and the Spectrum will hang up — this is due to a rather nasty piece of programming in lines 7330 and 7340.

```
7600 REM THIS PROCEDURE PRINTS          THE HI
GH SCORE TABLE
7620 CLS : FOR I=0 TO 21: PRINT  PAPER 3,,: N
EXT I
7630 FOR N=1 TO 5: PRINT  PAPER 3; INK 6;AT 8
+N,4;R$(N);AT 8+N,13;A$(N);AT 8+N,23;B(N): NE
XT N
7640 INK 7: BRIGHT 1: PLOT 172,116: DRAW 0,-6
2: PLOT 170,116: DRAW 0,-62: PLOT 100,116: DR
AW 0,-62: PLOT 98,116: DRAW 0,-62: PLOT 52,12
5: DRAW 150,0: PLOT 20,120: DRAW 210,0: DRAW
0,-70: DRAW -210,0: DRAW 0,70: PLOT 24,116: D
RAW 202,0: DRAW 0,-62: DRAW -202,0: DRAW 0,62
: BRIGHT 0: INK 0
7660 PRINT  PAPER 3; BRIGHT 1; INK 7;AT 5,8;"
HIGH SCORE TABLE"
7670 PRINT  PAPER 3; INK 7;AT 8,6;"Rank";AT 8
,15;"Name";AT 8,23;"Score"
7690 RETURN
```

Lines 7600-7690 Print up the 'high score' table on-screen.

```
7900 REM CREATES GAME-SCREEN
8000 FOR I=0 TO 21: PRINT  PAPER 2;AT I,0;"
       ": NEXT I
8005 PRINT  PAPER 2; INK 7;AT 5,0;"bbbbbbb";A
T 10,0;"bbbbbbb";AT 15,0;"bbbbbbb"
8010 LET X=0: LET XX=0: LET XXX=0
8020 PRINT  PAPER 2; INK 6;AT 6,1;"AMMO";AT 1
,1;"SCORE";AT 16,1;"HI-SC"
8030 PRINT  BRIGHT 1; PAPER 2; INK 7;AT 18,0;
A$(1);AT 20,1;B(1)
8040 PRINT  PAPER 2; INK 6;AT 11,0;"SHIELDS"
8050 FOR I=0 TO 18: PRINT  PAPER 5;AT I,7,,:
NEXT I
8055 REM  PLOT 63,24: DRAW 186,0
8060 PRINT  PAPER 4; INK 7;AT 21,7;"        SHIE
LD STRENGHT     "
8065 PRINT  PAPER 6;AT 20,7;"
"
8070 PRINT  PAPER 6;AT 19,7;"
"
8080 INK 7: PLOT 0,0: DRAW 55,0: DRAW 0,175:
DRAW -55,0: DRAW 0,-175: INK 0
8087 INK 7: PLOT 255,0: DRAW 0,175: INK 0
8099 RETURN
```

Lines 7900-8099 Print up the main screen for the game.

```
8400 REM THIS PRINTS THE INTRODUCTION TO THE
GAME
8500 BORDER 5: FOR I=0 TO 21: PRINT  PAPER 5,
,: NEXT I
8510 BRIGHT 1: INK 7: PLOT 0,0: DRAW 255,0: D
RAW 0,175: DRAW -255,0: DRAW 0,-175: INK 0: B
RIGHT 0
```

Lines 8400-8510 Prepare the screen for the five pages of instructions necessary for the game.

```
8515 PRINT  PAPER 5;;AT 5,8;"WELCOME SOLDIER"
8520 PRINT  PAPER 5;AT 8,3;"YOUR MISSION IS T
O PROTECT"
8525 PRINT  PAPER 5;AT 10,3;"BASE SPECY3 FOR
AS LONG AS"
8530 PRINT  PAPER 5;AT 12,3;"POSSIBLE WHILE E
VACUATION "
8535 PRINT  PAPER 5;AT 14,3;"OF ALL ESSENTIAL
 STAFF AND "
8540 PRINT  PAPER 5;AT 16,3;"EQUIPMENT TAKES
PLACE ."
8545 GO SUB 8965
```

Lines 8515-8545 The first screen of instructions are printed up on-screen.

```
8615 PRINT  PAPER 5;;AT 5,3;"THE CONTROLS YOU
 WILL NEED"
8620 PRINT  PAPER 5;;AT 7,8;"TO USE WILL BE "
8625 PRINT  PAPER 5;;AT 10,6;"'Q' - TO MOVE L
EFT"
8630 PRINT  PAPER 5;;AT 12,6;"'W' - TO MOVE R
IGHT"
8640 PRINT  PAPER 5;;AT 15,4;"'BREAK/SPACE' -
 TO FIRE "
```

Lines 8615-8640 The second screen of instructions are printed up on-screen.

```
8645 GO SUB 8965
8700 PRINT  PAPER 5;;AT 4,3;"BASE SPECCY3 IS
UNDER ATTACK"
8705 PRINT  PAPER 5;;AT 6,3;"FROM THE ENEMY'S
 R3 AND K6 "
8710 PRINT  PAPER 5;;AT 8,3;"TYPE FIGHTERS   "
8715 PRINT  PAPER 5; INK 2;;AT 8,18;" 'cd'
'ef'"
8720 PRINT  PAPER 5;;AT 10,3;"AS WELL AS FROM
 ATTACK BY"
8725 PRINT  PAPER 5;;AT 12,3;"THE LATEST XTC-
MISSILES"
8730 PRINT  PAPER 5; INK 2;;AT 12,27;"'a'"
8735 PRINT  PAPER 5;AT 14,3;"NOTE CAREFULLY T
HAT MORE "
8738 PRINT  PAPER 5;AT 16,3;"THAN ONE SHOT MA
Y BE NEEDED"
8740 PRINT  PAPER 5;AT 18,3;"TO DESTROY THE E
NEMY"
```

Lines 8645-8740 The third screen of instructions are printed up on-screen.

```
8745 GO SUB 8965
8800 PRINT  PAPER 5;;AT 5,4;"YOUR JOB IS TO H
OLD OUT"
8805 PRINT  PAPER 5;;AT 7,4;"UNTIL YOUR SHIEL
DS ARE "
8810 PRINT  PAPER 5;;AT 9,4;"KNOCKED-OUT OR U
NTIL YOU "
8815 PRINT  PAPER 5;;AT 11,4;"RUN OUT OF AMMU
NTION  -"
8820 PRINT  PAPER 5;;AT 14,4;"AFTER WHICH TIM
E THE BASE"
8825 PRINT  PAPER 5;;AT 16,4;"IS DEFENCELESS
AND IS "
8830 PRINT  PAPER 5;;AT 18,4;"OVER-RUN BY THE
 ENEMY "
8837 DATA 227,199,142,156,248,240,224,128
```

Lines 8745-8837 The fourth screen of instructions are printed up on-screen.

```
8845 GO SUB 8965
8850 PRINT  PAPER 5;;AT 5,3;"BY THE WAY I ALM
OST FORGOT"
8855 PRINT  PAPER 5;;AT 7,3;"TO TELL YOU THAT
 YOUR "
8860 PRINT  PAPER 5;;AT 9,3;"PROMOTION CHANCE
S DEPEND"
8865 PRINT  PAPER 5;;AT 11,3;"ON YOUR SUCCESS
 IN HOLDING"
8870 PRINT  PAPER 5;;AT 13,3;"OUT AGAINST THE
 ENEMY"
8875 PRINT  PAPER 5;;AT 17,6;"BUT GOODLUCK AN
YWAY"
8880 GO SUB 8965
```

Lines 8845-8880 The fifth screen of instructions are printed up on-screen.

```
8960 GO TO 8980
```

Line 8960 Jumps past the 'wait' subroutine.

```
8965 LET I=0
8967 LET I=I+1: LET B=INT (RND*20)+5: BEEP .3
,B: IF I<30 AND INKEY$="" THEN  GO TO 8967
8970 FOR I=1 TO 20: PRINT  PAPER 5;AT I,2;"
                           ": NEXT I: RETURN
```

Lines 8965-8970 The 'wait' routine plays a few musical notes while the screen is being read. This isn't the best place for this routine as line 8960 causes the program to jump straight past it; a better place might be just after line 9000.

```
8990 FOR I=1 TO 100: NEXT I
8995 RETURN
```

Lines 8990-8995 Contain the 'wait' loop.

```
9800 REM ***************************  USER DE
FINED CHARS  ********************************
*******
9810 RESTORE 9800: FOR N=USR "a" TO USR "f"+7
: READ A: POKE N,A: NEXT N
9815 FOR N=USR "j" TO USR "o"+7: READ A: POKE
 N,A: NEXT N
```

Lines 9800-9815 Set up the user-defined graphics.

```
9820 DATA 42,42,28,28,28,62,28,8
9825 DATA 0,255,0,255,0,0,0,0
9830 DATA 206,231,113,57,31,15,1,1
9835 DATA 115,231,142,156,248,240,128,128
9840 DATA 30,15,1,1,127,255,127,1
9845 DATA 120,240,128,128,254,255,254,128
9850 DATA 0,0,0,0,0,4,28,255
9855 DATA 60,60,126,126,90,66,165,24
9860 DATA 0,0,0,0,0,32,112,255
9865 DATA 0,24,60,60,60,60,60,60
9880 DATA 16,20,25,170,108,52,44,88
9890 DATA 102,90,183,215,237,118,102,60
9899 RETURN
9999 STOP
```

Lines 9820-9999 Contain the data for the user-defined graphics. YS

PROGRAMMING ON SPEC

Here at *Your Spectrum*, we pride ourselves in providing you with the best in software each and every month. And how do we manage this amazing feat ... well, we don't — but *you do!*

A number of programs *are* submitted for publication from readers and, as you've no doubt gathered from past issues, the quality is pretty excellent. But that doesn't mean we don't want to hear from *you* — *Your Spectrum* is *your* magazine so make use of it. You're one of two million Spectrum users — don't just sit there, write us a program and be famous!

All we're looking for is a bit of originality, a sense of humour and some competent code. (Have a look at Gavin Monk's program in last month's issue if you're looking to nick some ideas to 'pretty up' your programs.) All we ask is that you don't type up a program from another magazine or book as we always find out in the end and your name will be mud throughout the industry. (Remember the game, *Ground Attack* in *YS* issue 7? Well, the so-called author of that particular game *(We wouldn't want to mention his name because that would be indiscreet ... Anthony Crawford. Ed.)* stole it lock, stock and barrell from a weekly computer magazine; we didn't find out until after it had been published.)

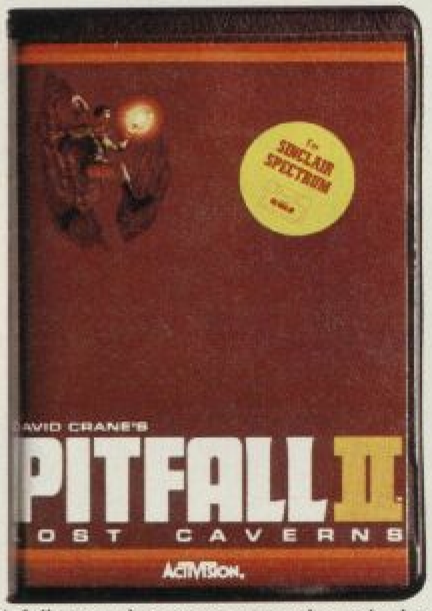
As further incentive, we do pay a sizeable sum for *good* programs. All we ask is that each program comes on cassette, with a written introduction and an annotated listing. Please send all programming contributions to:

Gavin Monk, Your Spectrum, 14 Rathbone Place, London W1P 1DE.

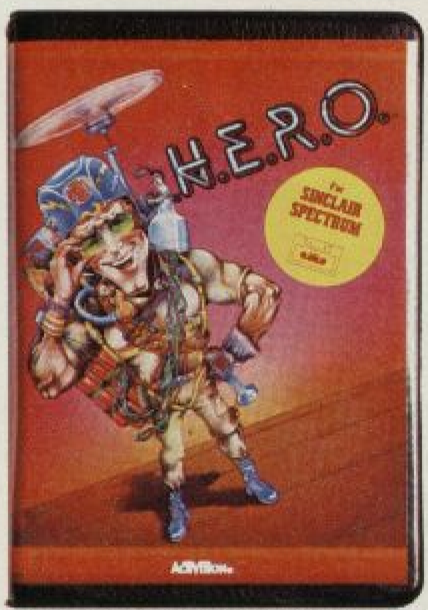


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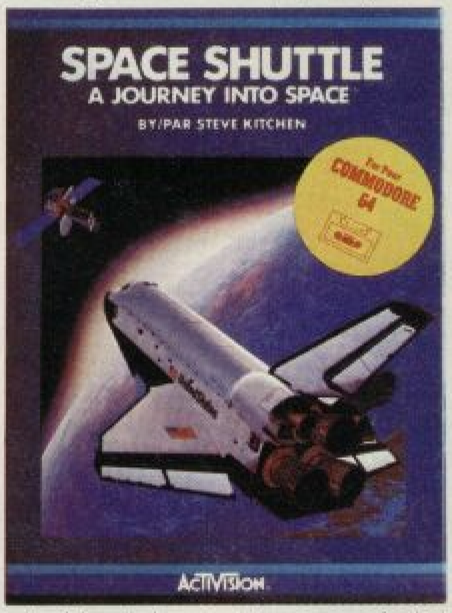
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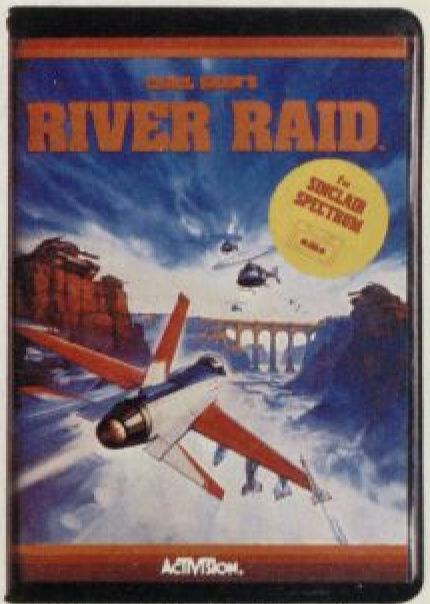
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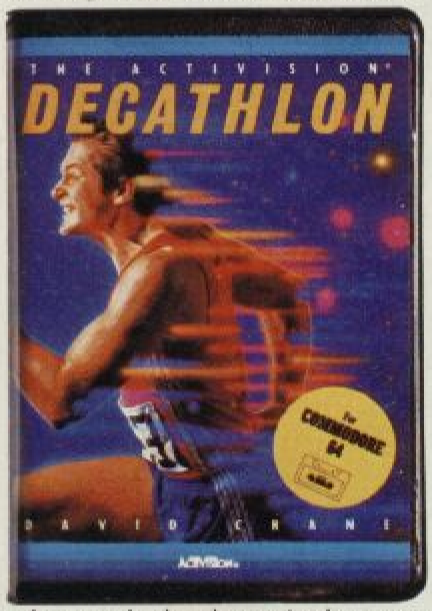
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■ Swop Atari VCS with two cartridges for Interface 2 with Quickshot II joystick, or will sell for £50. Richard McBride, 76 Duncastle Road, Newbuildings, Londonderry BT47 2SF.

■ 48K Spectrum, Currah MicroSpeech, Stack light rifle (all boxed with instructions) only £140. Alan Ireland. Tel. 031-449 2321 (Edinburgh area). Buyer collects.

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■ 48K Spectrum, Interface 1, Microdrive, Cambridge joystick, MicroSpeech, Dk keyboard, cassette recorder and lots of recent software. Worth £450+, sell for £290 (ono). Tel. Ruislip (08956) 38204 (evenings).

■ ZX Printer plus two rolls of paper £20. Interface 2 £12. Original Spectrum case and keyboard £10. Nick Reckert. Tel. 0279 26721 (office hours).

■ Will swop Kempston joystick and two games for Dk' Tronics lightpen (interface not included) or will sell package for £12.50. Tel. Cambridge 276915 and ask for Marc.

■ 48K Spectrum, Interface 1, Microdrive, Fuller keyboard, Kempston joystick, £150 of software. All worth £500, sell for £370 (ono). Tel. Staines 58690 and ask for Gary Piper.

■ ZX81 and 16K RAM plus learning lab, Filesixty keyboard, three software tapes. Want £90 (ono). Tel. Barnsley 725566 and ask for Richard.

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■ Centronics printer interface £30; also programmable joystick interface and Quickshot interface plus joystick £30. Tel. Copthorne 714235 after 5pm.

■ Bud programmable joystick interface for sale (£20 ono) — also willing to swop for Comcon. Tel. 0206 211100 after 6.30pm.

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SOFTWARE

Will swop nine games tapes, inc *Manic Miner, Stonkers, World Cup* and *Knight's Quest* for *White Lightning*. Original only. A Schmit, 2 Kenson Cottages, Llancadle, Nr Barry, South Glamorgan CF6 9AQ.

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■ Swop *Black Hawk, Speed Duel, Pool, Chess, Mr Wimpy, Loader* for Picturesque *Assembler*, and Hisoft *Devpac 3*. Tel. 0304 211350 and ask for Chris.

■ Twelve Spectrum tapes (originals) to swop. Send your list for mine, SAE please. Mark Chambers, 22 Bedford Avenue, Shaw OL2 7DW. Will accept software or hardware.

■ Would like to swop *Daley Thompson's Decathlon* for *Micro Olympics*, and also *Monty Mole* for any stack light rifle game. Games only played once. Tel. Cardiff (0222) 691674 after 6pm.

■ Have Ocean *Kong* and *Harry Goes Home* — will swop for *Jet Set Willy* and *Snooker*. Tel. 0383 728381 after 2.30pm. Also have *Football Manager*, will swop for *Olympimania*. Ask for Chris.

■ Swop *Jet Set Willy, Speed Duel* and *3D Tanx* for Softek *FP* or *IS Compiler*. Must have all instructions. Tel. 0225 812712. Timothy Scott, 55 Aylesbury Drive, Holland-on-Sea, Essex CO15 5RB.

■ Will swop *HURG* for *White Lightning* or *Quill*. Also have *Valhalla, 3D Tunnel* and *Cookie*. All offers considered — must be originals! Ring Yeovil (0935) 76788 (7pm-9pm) and ask for Stephen.

■ Will swop *Alchemist, Mined-Out, Zzoom* or *Cookie* for *Giant's Revenge, High Noon, Paintbox, Pole Position* or *Enduro*. Tel. Leeds (0532) 572700 after 4pm. Will swop all my games for Currah MicroSpeech.

■ Swop any two out of *Zzoom, Zip Zap, Alchemist, Lunacrabs* or *Mr Wimpy* for *Lords of Midnight* or *Decathlon* (Ocean). Any three for *The Hobbit*. Ring weekdays after 6pm. Tel. 0274 571341 and ask for David.

■ Swop *IS Compiler* for *Zeus Assembler*. Tel 0562 882100.

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■ Will swop *Psytron* for *Fighter Pilot, Match Point, Hunchback*. *Psytron* is brand new! Tel. 0793 40549 or Prestel Mailbox. Andy, 14 Read Street, Swindon, Wilts SN1 5HS.

■ Swop Level 9 *Collosal Adventure* for any other Level 9 adventures. Tel. 051-531 7092 and ask for Maghull.

■ Have got *Wheelie* and *Race Fun* to swop. Would consider anything. Tel. 0386 47096 and ask for Robert.

■ Have *HURG*, will swop for *White Lightning* (including manual). Tel. East Grinstead (0342) 314349 and ask for Andrew.

■ Have *Tranz Am* and *Manic Miner*, will swop both for *Psytron*. I also have *Kong* and *Urban Upstart* and am willing to swop both of these for *Cavelon*. Tel. 0339 2790 and ask for Michael. Originals please.

■ Will swop *Scope 2* or any three of many games for *Complete M/C Tutor* (must be original with box and manual). All programs are originals and in perfect condition. Tel. 031-336 3588 after 5pm.

■ Would like to swop *Manic Miner, Hunchback, Trashman, Mugsy, Alchemist, Atic Atac* and *Zzoom* for *TLL, Psytron, Lords of Midnight, Match Point, Full Throttle* and *Nightflight II*. Tel. Tedburn St Mary 508.

■ Will swop *Warlock of Firetop Mountain* for any entertaining game (excluding adventures). Tel. 0900 822166 after 6.30pm.

■ Swop *Jet Set Willy, Games Designer, Sabre Wulf* for *White Lightning, Match Point, Kosmic Kanga* or *DT's Decathlon*. Tel. 01-286 1673. Weekends only please.

■ Will swop *Penetrator, Cookie, L Jetman, Manic Miner, Starclash* and others for *Ad Astra* and *Stonkers*. Send your list for mine and enclose SAE. Alan McKeen Jnr, 103 Mansfield Avenue, Cleveland, TS17 7HZ.

■ Have *Thrusta, Orion, 1984, Antics, Pheenix, Psytron, Black Crystal, Trashman, Krakatoa, Pyramid, Frank'n'Stein, Flippit*. Swop for ZX Printer or *Pyjamarama, Olympimania, Stop The Express, Sabre Wulf, Match Point*. 19/6 Stafford Aston Street, Birmingham.

■ Will swop *Sorcery, Splat, Chess, Cookie, Spawn of Evil, Magic Means, Survival* and *Make-a-Chip* for *Manic Miner, Football Manager, Sabre Wulf* or any other good software. Tel. 0532 633005 and ask for Graham.

■ Swop *Mr Wimpy, Horace Goes Skiing* and *The Train Game* for any top selling game. Writing to A Gumm, 3 Chestnut Walk, Botley, Southampton, Hampshire SO3 2FS. All offers welcome.

■ Swop *Orc Attack, Mugsy, Bugaboo, Scuba Dive, Devils of the Deep, Black Crystal, Android Two* for *TLL, Automania, Trashman, Kokotoni Wilf*. Also *Hobbit* for swop. Tel. 0909 474448 and ask for Andrew.

■ Swop *Xadom, Blue Thunder, Violent Universe, Timegate, Transylvanian Tower, Psytron, Dictator, Ad Astra, Hunter Killer, Space Shuttle* for *Match Point, Stonkers, Braxx Bluff, Combat Lynx, Delta Wing*. Tel. Dundee 68197.

■ Swop *Decathlon, Ant Attack, Hunchback, Whodunnit* (all originals) for *Psytron, Olympimania*. Tel. Drighunton 853691 after 5pm. Ask for Darren.

■ Swop *Chequered Flag, Horace Goes Skiing* (never used) for any two of *Backgammon, Cribbage, Yahtzee, Chess Tutor*, or any one of *Valhalla, Lords of Midnight, Sherlock, Eureka*. DW Bradley, 20 Charnock St, Preston, Lancs PD1 6DR.

■ Swop *The Warlock of Firetop Mountain, TLL, Morris Meets the Bikers*, for adventure games, or all three for *Pimania*. Graham Glendale, Kennel Ride, N Ascot, Berks.

■ Swop *Mugsy* and *Planetoids* for *Kosmic Kanga, Match Point* or *TLL*, or swop both for *Secret Mission*. Tel. Billericay 22415 (not office hours) and ask for Alex.

■ Swop *Valhalla, Monty Mole, Crusoe, Lords of Midnight, Decathlon, Doomsday Castle, Classic Adventure*, for software or hardware. Tel. Polegate 4336 and ask for Jason.

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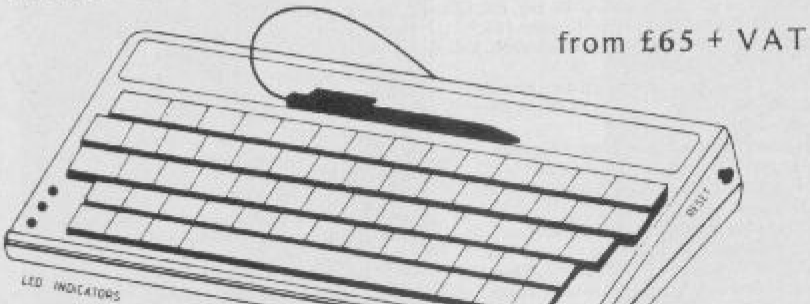
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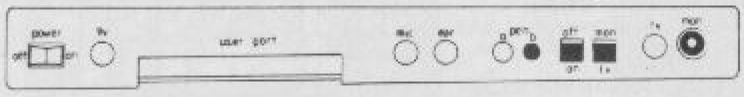
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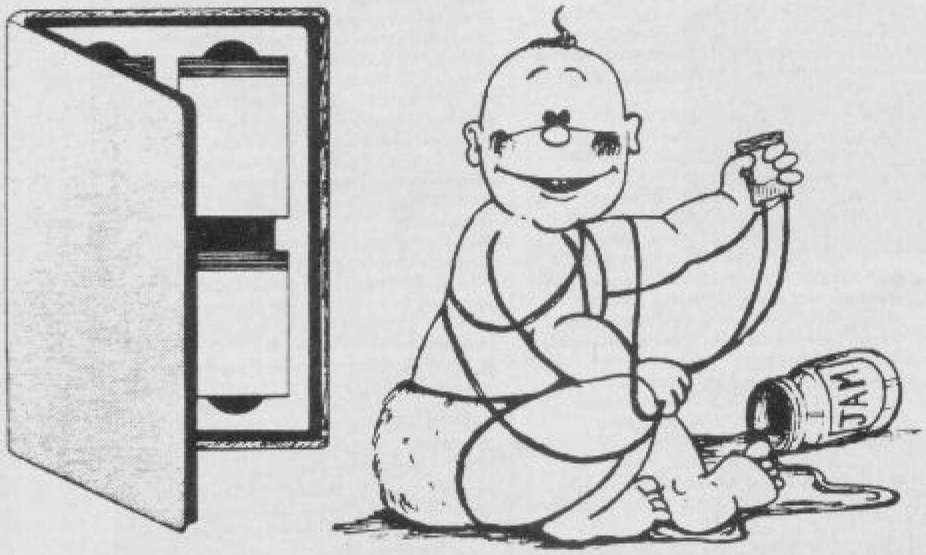
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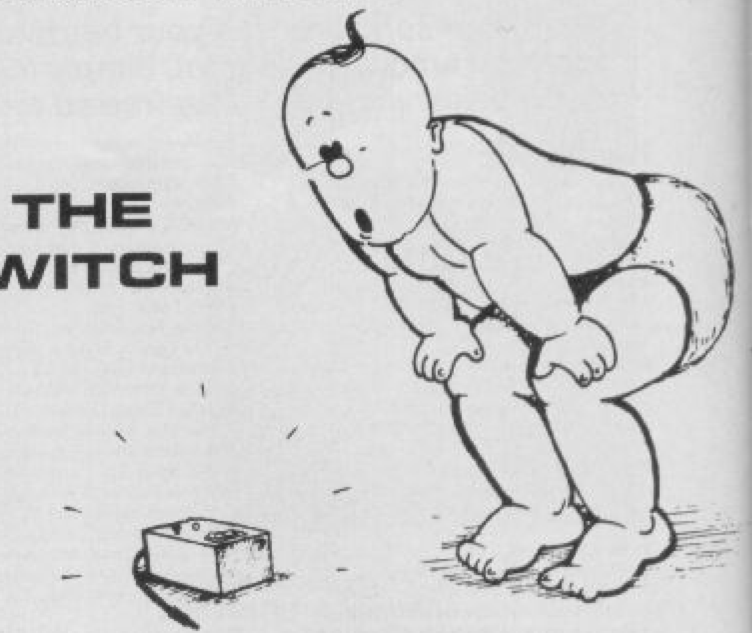
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■ To swop: *Atic Atac, Lunar Jetman, Ant Attack, Jetpac, Mr Wimpy* and others. Tel. Runcorn 74609 after 6pm and ask for Paul.

■ Swop: *Stonkers, Hunchback, Fred, Trashman, Vu-3D, Flight Simulation, Zig-Zag, Jumbly, Android I*, for *Automania, Factory Break Out, Full Throttle, Beach Head*. Tel. Harlow 37606.

■ Swop: *Heathrow, Compushare* (investment management) and *Flight Simulation* for *Bridgemaster, Scrabble, Psytron* or any accounts/finance programs. Tel. Oxted 6175.

■ Swop: *Black Crystal, Micro Olympics, Dallas, Golf, Manic Miner, Black Hole*, for *TLL, Full Throttle, Empires* or any good wargame. J Rogers, 26 Harry Price House, Hartlebury Road, Oldbury, Warley B69 1EQ.

■ Swop *Lords of Midnight* or *Hulk* for *White Lightning*. Tel. 0723 378240.

■ Swop: software games for utilities, toolkits, etc, and electronics/computing knowledge with like-minded Spectrum user in greater Manchester area. Tel. Wigan 224797 and ask for Darren.

■ I have many great games to swop. If interested, please write to Dovi Keich, 26 Hameshoreret, Rachel Street, Jerusalem, Isreal 96348.

■ I have 54 originals to swop. I especially want *Psytron, TLL, Sabre Wulf* and *Ad Astra*. Send your list for mine. Richard Allen, 2 Ballymacash Road, Lisburn, Co Antrim, N Ireland BT28 3DR.

■ Wanted: *Beaky and the Egg Snatchers, Monty Mole* and *Jack and the Beanstalk*. Will swop selection of *Jet Set Willy, Manic Miner*, and *Horace* games, *Hunchback* and *Chuckie Egg*. Tel. Brisol 741964.

■ Swop *Tank Trax, Rifle Range, Editor Assembler, 16/48* issue 9 and *Spectrum Pocket Book*, all for *Devpac 3*. Tel. 0386 552073 and ask for Philip.

■ I have lots of original games to swop. Send your list for mine. Stephen Elmer, 19 Brooksfield, Bildeston, Ipswich, Suffolk 1P7 7EJ.

■ Hundreds of original Spectrum programs to swop. Send your list for mine. Mark Tynan, 18 Sea Grange Avenue, Baldoyle, Dublin 13, Ireland.

■ Swop *Hurg, Frank 'n' Stein, Decathlon, TKV, Psytron* for *White Lightning, Automania, TLL, Lords of Time* and *Pyramid*. Write to Adrian Pemberton, 56 Henblas Rd, Rhostyllen, Wrexham, Clywd.

■ Swop: *Cricket Captain, Make a Chip* and *Survival* for *Match Point, Sabre Wulf* or the *Complete Machine Code Tutor* (originals only). Tel. 0438 727516 and ask for Graham.

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WANTED

■ I need issues 2 and 3 of *Your Spectrum*. I'll pay up to £1.25 per issue if in good condition and complete. Tel. 0243 527188 (evenings only) and ask for John.

■ Protek joystick interface, will sell for £10 or swop for Kempston joystick interface. Also swop *Hunter Killer* for *Jungle Trouble, Atic Atac, TLL* or *Worse Things Happen At Sea*. Mr S Cheesman, 92 Morven St, Creswell, Worksop, Notts.

■ Microdrive and Interface 1 wanted. Must work. Tel. 0562 882100.

■ Modem wanted, will swop *TransAm* plus money for it. Tel. Brighton 202545 (evenings) or 26633 (daytime).

■ Please help! I would like an RS232 Spectrum driver to communicate with an Apple II or any other micro. Thanks. N Payne, 79 Isambard Close, Cowley, Middx UB8 3TX.

■ ZX Printer or Alphacom 32 printer wanted. Send asking price to Mr C Cregg, Kilmallock, Co Limerick, Ireland.

■ Wanted: a computer compatible cassette recorder, a ZX or Alphacom printer and issues 80, 81 and 82 of *PCN*. Prepared to buy separately. Tel. 0705 482700 and ask for Matthew.

■ *YS* issues 2 and 3 with *Ant Attack* poster (or at least a reproduction of it) needed. Contact Mattia Quilici, Via Taccini 7, Rome 00197, Italy.

■ Help! I'm desperately in need of a fast M/C routine to plot graphics (of any size) suitable for writing commercial games. M Harvey, 28 Ingleby Drive, Tadcaster, N Yorks LS24 8HW.

■ *YS* issue 7 required. Must be complete. £1 for good condition copy. Write to Paul Jackman, 6 Whinfield Rd, Ulverston, Cumbria LA12 7HG.

■ Any books on machine code wanted cheap. Tel. 0621 817279 and ask for Paul.

■ Wanted. Information on how to convert Microdrive programs so that they support the Rotronics Wafadrive. JS Dowker, Dept of Theoretical Physics, The University, Manchester 13.

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■ Broken Spectrums wanted for school projects, with or without keyboard. A Davy, 12 Clover Drive, Thorrington, Essex CO7 8HL.

■ I want a 48K Spectrum. Can you help? Mr D Britton, 10 Cicely St, Liverpool 7, Merseyside.

■ I need issue 7 of *YS* and issue 1 of *Crash*. Will pay up £1.50 for each if in good condition and complete. 0761 413975 after 4.30 pm.

■ Microdrive and Interface 1 wanted. Swop for Casio MT45 synth (makes good music with computer and MPU 1000 with four cartridges). Worth £160, will sell for £90 (ono). Tel. 01-809 2841, 5-9pm.

PENPALS

■ English boy would like pen friend any nationality (boy or girl) who likes computers, horses and writing. Leigh McCann, 497 Southport Road, Bootle, Merseyside L20 0DB.

■ 'Puter graphics fanatic and artist (17) would like female penpal. Likes include alternative comedy, panecology, electronics, Speccy bashing, electronic music and Sci Fi. Ken Davidson, 6 Solway Place, Glenrothes, Fife.

■ Wanted: Spectrum penpals. I am called Graham and I own a Spectrum 48K. I like most of the software that's out. Tel. 0532 633005.

■ 14 yr. old machine code programmer wants penpal to exchange hints, tips and ideas. Write to Matthew Houseley, 17 Spindle Close, Havant, Hants PO9 2PX. Tel. 0705 482700.

■ Penpals young or old. I'm 34, into computing, photography, exploring countryside, and I can't find Ofnir in *Valhalla*. Please write to Tony Hughes, 63 Linden Avenue, London NW10.

■ Penpal wanted. I've just got a computer and I'd like to hear from someone who would help me. I'm 14. I would also like to swop some tapes. Pamela Newall, 61 Russell Drive, Ayr, Scotland KA8 8JJ.

■ Christian Spectrum user seeks contact with other Christians with an interest in computing. Contact Ron Crompton, 110 Cliff Park Avenue, Wakefield, W Yorks WF1 2DW.

■ Hi! I'm Allan. I'm a bit of a whiz-kid with computers and I'd like to meet you if you are likeminded and looking for someone like me. You must be female and want to create a super-race of Speccy-fiends. Allan Poulter, 41 Limborough House, Thomas Road, London E14 7AW.

■ I'd like a girl penpal to share hints and tips, etc, on human programming and inter-relation controls. Write to Gregory John, PO Box 75070 GR-176-10, Kallithea, Athens, Greece.

MESSAGES

■ Male Speccy owner wants female Speccy owner for meetings and friendly relationships. Female must be over 17, photo essential. Write to Brian Pilgrim, 90 Sandrock Road, Lewisham, London SE13 7TP.

■ Anyone done *Pyjamarama* yet? Be interested to know if you have. Personal best is 83%. What is the magnet for? Help!! Chris King, 83 Lime Grove, Swinton, Mexborough, S Yorks S64 8TX.

■ Help! I want to put my cassette-based games on to Microdrive. Can anyone out there help me. D Black, 5 Swan Court, Woodchurch Road, Birkenhead, Merseyside.

■ Please, please, please can anyone tell me how to open the musical door in *Fantasia Diamond*. The conductor just won't take a blind bit of notice of me. Pete Sumpner, A (24467433), Mons Barracks, Aldershot, Hants GU11 2LF.

■ Risca computer club in Gwent meet Sunday evenings at 6.30pm at Risca Youth Centre. Further details, Mike Chivers, 13 High St, Crosskeys, Gwent NP1 7FR.

■ Hints and POKEs brochure No. 1 offers hundreds of arcade and adventure hints and POKEs for 100 popular games. Send only 50p cheque/P.O. to CB Dineen, 15 Gordon St, Gorton, Manchester M18 8SI.

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FLOYD 40

Due to an error the advertised price in the December issue was incorrect. This has now been corrected and we apologise for any inconvenience this error may have caused.

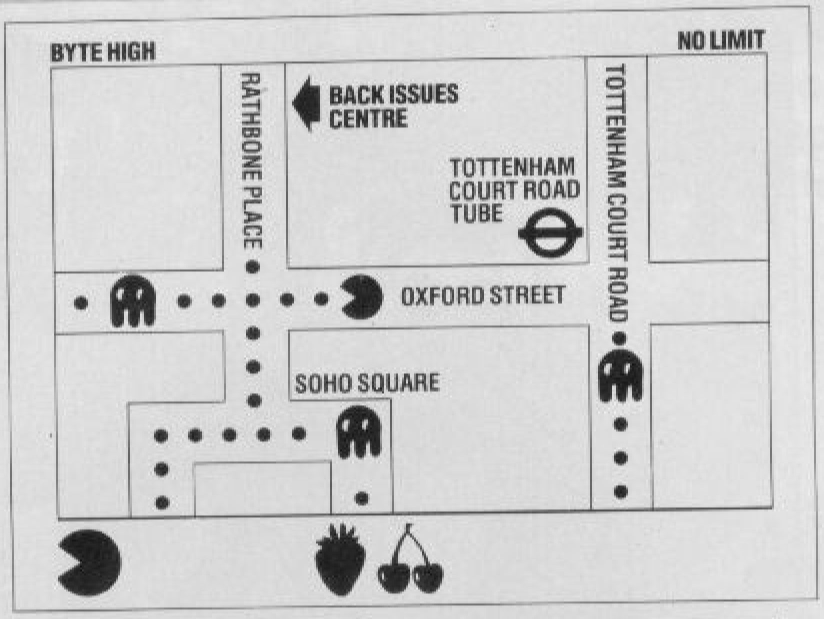
The correct price of the FLOYD 40 printer is £79.95 (£4.95 p&p).

BACK ISSUES



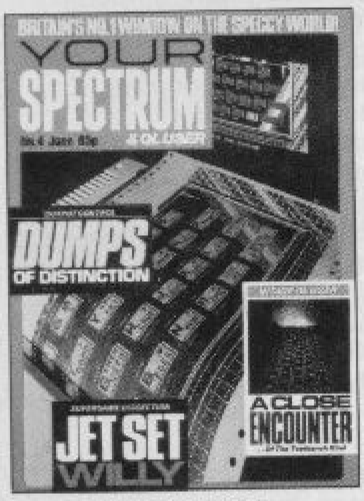
VOL 1/1 (DEC/JAN 1984)

REVIEWS
Currah's MicroSpeech, general computing books, joysticks.
FEATURES
Speech synthesis, Toni Baker's machine code break-out, Spectrum communications, DIY keyboard buffer, machine code scrolling.
GAMES
Chess packages.



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VOL 1/4 (JUNE 1984)

REVIEWS
Spectrum disk drives, QL roadtest, adventure programming books.
FEATURES
DIY joystick interface, synthesiser control, *ZIP* compiler [pt. 2], colour simulation screendumps.
GAMES
Hacker's review plus full map of *Jet Set Willy*.



VOL 1/5 (JULY 1984)

REVIEWS
British Micro's Grafpad, DIY computing books.
FEATURES
Computerised bulletin boards and modems, software for printer interfaces, *ZIP* compiler [pt. 3], DIY joystick interface.
GAMES
Gilsoft's *The Quill*.



VOL 1/6 (AUGUST 1984)

REVIEWS
Spectrum toolkits, games programming books.
FEATURES
Hacking into *Jet Set Willy*, explosion routines, *ZIP* compiler [pt. 4], files on Microdrive, DIY Centronics interface [pt. 1].
GAMES
Ultimate's *Sabre Wulf*.



VOL 1/8 (OCTOBER 1984)

REVIEWS
Graphics toolkits, programming languages books.
FEATURES
Microdrive recovery, Project 3 revisited, multi-tasking your Spectrum, *YS MegaBasic* [Pt. 1].
GAMES
Vortex's *TLL*.



VOL 1/9 (NOVEMBER 1984)

REVIEWS
The Spectrum+ preview, Spectrum speech synthesisers.
FEATURES
Spectrum and QL link, *YS MegaBasic* [Pt. 2].
GAMES
Frank N Stein, Astronut, Monty Mole, Lords of Midnight, Sherlock, The Hobbit.



VOL 1/10 (DEC/JAN 1985)

REVIEWS
ZX Spectrum+.
FEATURES
Codebusters [Pt.1], Interface ROMs, *YS Megabasic* [Pt. 3], M/C Sprite Designer.
GAMES
Deus Ex Machina, Hampstead, Peter Pan, Eureka.

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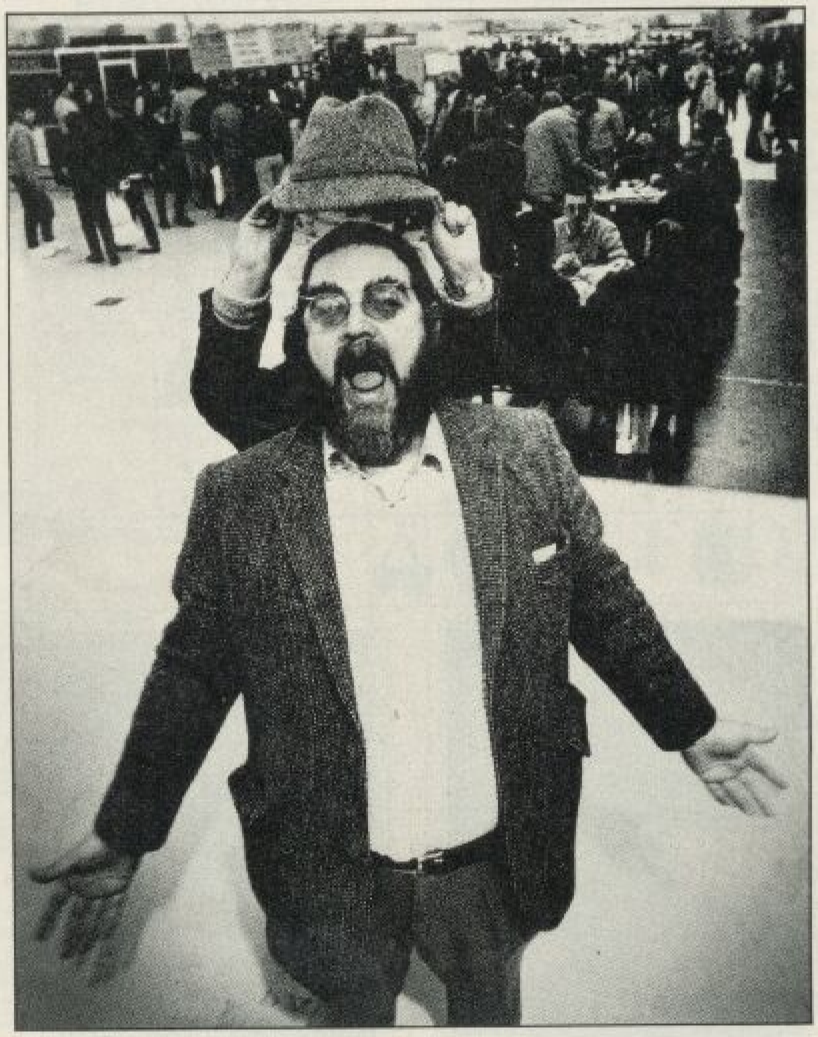
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CIRCE

***What could possibly turn a Civil Servant into a successful exhibitionist?* Sue Denham *meets the man behind the ZX Microfairs ...* Mike Johnston.**



TONY SLEEP

ALL THE FUN OF THE FAIR

ZX Microfairs have become almost as much a part of the Sinclair Research success story as has the Spectrum itself. But these micro exhibitions aren't the product of a large company hoping to cash in on users' enthusiasm, they're more of a tribute to one man's dedication to his hobby...

It's just 24 hours away from the Christmas Microfair and the organiser Mike Johnston can be found right in the thick of the action, directing exhibitors to their respective stands in much the same way as a host welcomes guests to a family get-together. But then, after four years of putting on shows, what else would you expect?

Keeping one eye out for any crisis that might arise in the hall, Mike talked of how he first became involved in exhibition work. "Well, I suppose it all began after I'd joined up as a member of the National ZX80/81 Users' Club. I was always annoying Tim Hartnell to arrange a meeting between members ... and eventually he did. Expecting about half a dozen people to turn up, he suggested that everyone meet in a West London pub — and to our surprise, over 70 members turned up. It was great, everyone was chatting about which RAM pack was the best value and so on.

"After our first meet, I badgered Tim Hartnell to arrange another, but he was too involved with book publishing by this time to offer me anything other than moral support and the suggestion that I do it myself! Tentatively, I got in touch with a few people like David Heelas, Mike Lord and Nick Lambert and tested their reaction to exhibiting in a small show ... and it was good! I scouted around for a hall and, after a brief period contemplating a hall in Camden Town, I settled for Central Hall in Westminster."

What are your memories of the first show — did anything go wrong? "Hah! Did anything go right, you mean. I'd only booked half the hall, as I wasn't convinced that we'd have more than a couple of hundred people to see the show at most; there'd been no mentions in the press except for a small piece in *PCW* — advertising was out of the question with me financing the whole shebang. I can remember opening the doors and a flood of people gushing into the hall!

"Anyway, there we were watching thousands of people running into the hall until it was at bursting point! Everyone just stood around wondering what to do next. I rushed out of the hall and grabbed the nearest policeman. He stood on a chair and asked everyone to file out again — of course, human nature being what it is, no-one moved ... they didn't want to lose their place in the queue. A few people started laughing and that was it — pretty soon the whole place was just falling about with tears rolling down their cheeks. In all, we had around 5,000 people at that first show — it was amazing."

Although Mike Johnston spends a lot of time organising the fairs, in 'real' life he's a Civil Servant. Has the Microfair brought him fame and success? "I don't know about fame. I do have a lot of people I've never seen before come up and say 'Hullo, Mike', but it's not quite as I'd imagined it. Success is a funny sort of word. I do make some money out of the fairs, but then if I didn't I'd never be able to put the next one on! The Microfairs have the cheapest admission around for this sort of show, and we do try to keep the exhibitors fees low just so that we attract everyone."

Now that the market has expanded and the retail outlets include shops like WH Smiths and Woolies, do you think there's a future for a show like this? "Yes, the market's a bit flat at the moment — the number of new products here this year *will* be less than at this time last year, but that's no reason why the ZX Microfair won't carry on. We're still attracting a *lot* of people over the two-day period, and they're the keen enthusiasts. When you buy a product in a shop, you take it home and that's it. But here, you can meet the people behind the product and chat to them. It's so much more friendly than your average chain store — and these people are experts in computing, which is a lot more than can be said for the high street shops.

"As long as the punters are interested, I'll be putting on shows. I've thought of organising shows for other types of computers, but I like Sinclair Research computers best ... I think they give the best value. Sir Clive's innovative and takes risks — there's a lot of excitement in doing that. A lot of professionals have moved into the market now, but it's *still* innovative. As long as something's new and different, you'll find it somewhere at the ZX Microfair."

Any regrets about having to organise all these shows on your own? "My one regret is that I don't have the time to fiddle about with computers any more. Of course, I own at least one of each of Sinclair Research's computers, and who knows how many add-ons. But I seem to spend most of my time with spreadsheets and databases on all sorts of computers planning for the next fair ... But I'm still one of Sir Clive's biggest fans!" YS

Editor Roger Munford; **Art Editor** Hazel Bennington; **Deputy Editor** Tina Boylan; **Technical Editor** Peter Shaw; **Art Assistant** Steve Broadhurst; **Editorial Consultant** Andrew Pennell; **Software Consultant** Gavin Monk; **Contributors** Terry Bulfib, Dr David Threlfall, Tony Samuels, Tim Hartnell, John Torofex, Chris Somerville, John Durst, Clive Gifford, Dave Nicholls, Roger Willis, Ross Holman, Henry Budgett, Sue Denham, Maurice David Wood, Patrick Donnelly, M Loftus; **Group Advertising Manager** Jill Harris; **Advertising** David Baskerville; **Group Art Director** Perry Neville; **Publisher** Stephen England; **Published by** Sportscene Specialist Press Ltd, 14 Rathbone Place, London W1P 1DE. **Telephone (all departments)** 01-631 1433. **Telex** 8954139 BunchG. **Typesetters** Carlinpoint, London; **Reproduction** Graphic Ideas, London; **Printed by** Chase Web Offset, St Austell, Cornwall; **Distribution** Seymour Press, 334 Brixton Road, London SW9. Telephone 01-733 4444. *Your Spectrum* is a monthly publication.

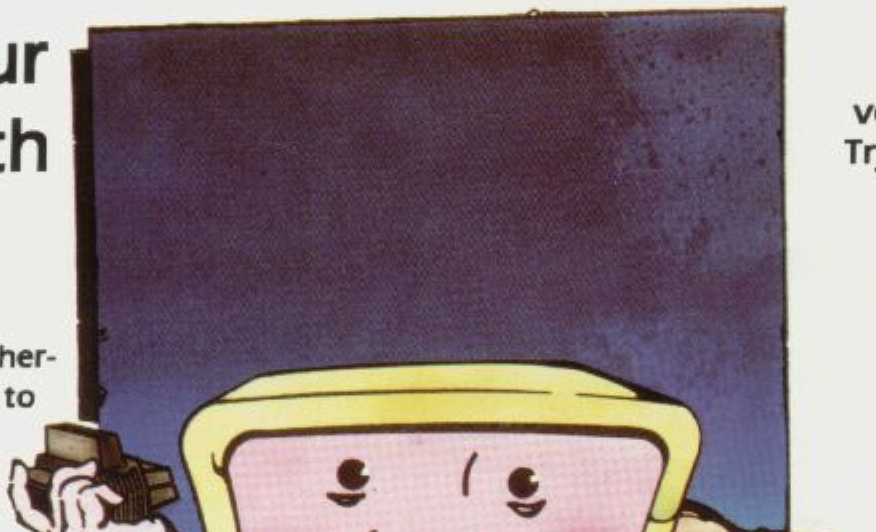
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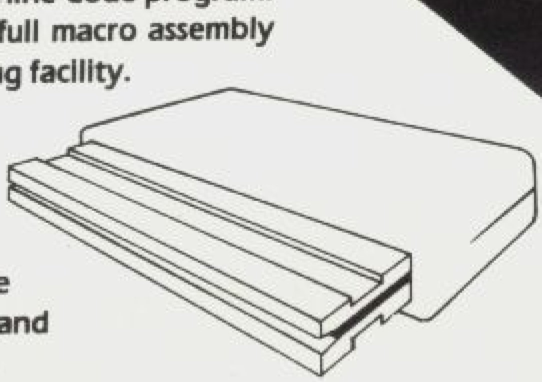


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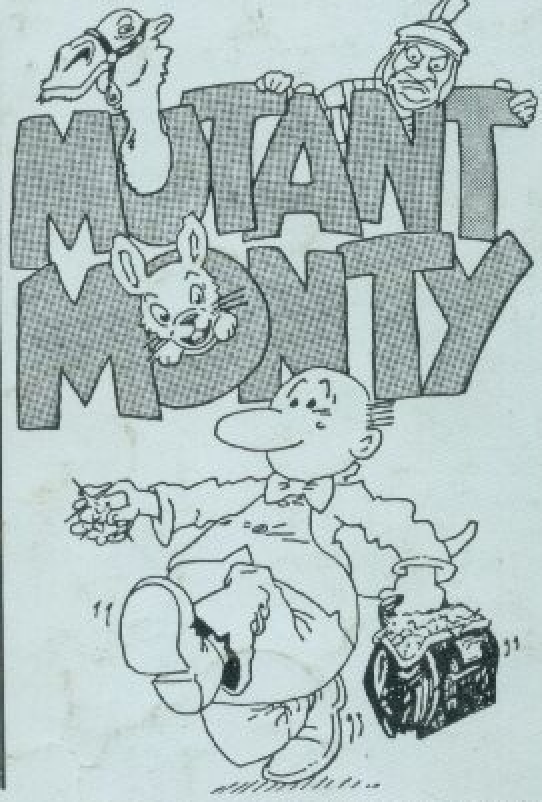
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